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ABSTRACT

A study was done to examine the effort put into their undergraduate study by University of California Davis students and their estimates of what they think they have gotten out of their study. The study used data collected from a stratified random sample of 300 Black students, 300 Chicanos, and 886 other students all of whom received a survey in the mail. Of the 1486 surveys mailed, 725 usable surveys were returned for a response rate of 49 percent. The major findings were: (1) Davis students resemble other students at peer institutions in the effort they put into undergraduate careers and the amount of gain they report; (2) Davis students differ from national counterparts in 8 of 15 Quality of Effort scales where they report greater effort; (3) Davis students report slightly smaller gains than their national peers in three areas; (4) students report slightly greater gains than their national peers in five areas; (5) men and women report similar effort in most areas; (6) differences in ethnicity are significant for six areas of effort; (7) class level is significantly associated with effort in nine areas of effort and three areas of gain; and (8) the effort reported by students varies significantly by field of study in 12 areas. Included are 38 tables. (Author/JB)

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EFFORT AND GAIN

THE UC DAVIS UNDERGRADUATE EXPERIENCE

Arthur K. Amos, Jr.

Student Affairs Research and Information

University of California, Davis

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EXECUTIVE SUMMARY

This study examines the effort put into their undergraduate careers by UC Davis students. And it looks at their estimates of gain, at what they think they have gotten out of their careers. It uses data collected from a stratified random sample of 300 Black students, 300 Chicanos, and 886 other students. Of the 1486 surveys mailed, 725 usable were returned for a response rate of 49%.

The study identifies the following major findings:

- UC Davis students resemble those at other doctoral granting universities in the amount of effort they put into their undergraduate careers and the amount of gain they report.

- UC Davis students differ significantly from their national counterparts on eight of fifteen Quality of Effort scales. On each of these they report greater effort.

- UC Davis students report slightly smaller gains than their national counterparts in three areas: vocational training, gathering information relevant to a career, and developing ability to learn on one's own.

- UC Davis students report slightly greater gains than their national counterparts in five areas: familiarity with the use of computers, awareness of different philosophies, understanding the nature of science, understanding new scientific and technological developments, and awareness of the consequences of science/technology.

- Men and women at Davis report similar effort in most areas. Women report greater effort in course learning, experience in writing, and personal experiences; men, greater effort in use of athletic and recreation facilities and in experiences with science/technology. Men report greater gain than women in science/technology.

- Differences in ethnicity are significant for six areas of effort: experiences with faculty, participation in clubs and organizations, experiences in writing, personal experiences, course learning and the use of athletic and recreation facilities.

- Class level is significantly associated with effort in nine areas of effort and three areas of gain: the more advanced the student, the greater the gain in science/technology, intellectual development, and vocational skills.

- The effort reported by students varies significantly by field of study in twelve areas. In addition, field of study is significantly associated with differences in gain reported in science/technology, in intellectual development, and in vocational skills.

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INTRODUCTION

The years spent as an undergraduate mark for most students the transition from adolescence to adulthood. During this period, they take the first, tentative steps in their life's work. For some, the undergraduate experience represents an opportunity to overcome hurdles resulting from their economic or ethnic backgrounds. For others, it represents their first extended contact with individuals from backgrounds different from their own. At its best, students emerge from the undergraduate experience more cultured, more intellectually developed, more tolerant and less provincial than when they entered.

The complexity of the undergraduate experience and the diversity of its outcomes contribute to the difficulty of fully comprehending it. A complete picture for a particular college or university would include, but not be limited to:

An understanding of those who attend the college, including differences in their educational and cultural backgrounds;

An understanding of the educational goals of students at the college;

An understanding of the influence of facilities and services provided by the college;

An understanding of the academic and social environments of the college;

An understanding of the short-term outcomes of college; a profile of those who stay to graduation and those who leave without a degree;

An understanding of what becomes of former students, both graduates and non-graduates, their careers, additional education, and what they think of their college years after leaving it; and

An understanding of what students contribute to the process.

Attempts to build a complete picture keep a myriad of analysts and scholars busy throughout the country doing studies and publishing reports. College testing services like ACT and ETS provide assistance, in the form of standardized instruments and national norms, to institutions attempting to understand what they are and what they do. One office at UC Davis, Student Affairs Research and Information, devotes a substantial proportion of its efforts to research into various aspects and outcomes of the undergraduate experience and to understanding what makes UC Davis a unique institution.

In 1988 and 1989, a group of scholars headed by Professor George Kuh of Indiana University included UC Davis in a study of fourteen institutions that, according to faculty and administrators across the country, excel in involving their students in outside activities (Kuh, et al). As part of this study, Student Affairs Research and Information sent a questionnaire to a stratified random sample of UC Davis under-

graduates (see Appendix A for a more complete description of implementation of the survey).

The questionnaire consisted of the standardized College Student Experiences Questionnaire (CSEQ) developed by Robert Pace and distributed by the Center for the Study of Evaluation (CSE), to which we added 10 campus-specific questions. The base instrument, chosen by the College Experiences Study, was used by all institutions participating in the study.

The College Student Experiences Questionnaire is divided into seven sections: Background Information, College Activities, Conversations, Reading/Writing, Opinions About College, The College Environment, and Estimate of Gains. The rationale behind the instrument is that the outcome of a college experience depends not only on the college environment provided by the institution but the quality of effort expended by the student. Thus, the core groups of questions—College Activities, Conversations, and Reading/Writing—attempt to assess that effort. For more details about the logic behind the College Student Experience Questionnaire, see Pace, 1983.

This report describes and analyzes some of the findings of that questionnaire—the personal, social, and intellectual gains reported by UC Davis respondents. Throughout the report a statistical significance level (alpha) of .05 is used. In the cases where a difference between two scores is discussed, this means there is only one chance in 20 that a similar difference would not be found in the population from which the sample was drawn.

HIGHLIGHTS

Attempts to reduce the complexity of the college experience for even one student, much less an entire undergraduate student body, to some simplistic picture must surely be doomed to failure. At best, such pictures are accurate in what they present and seriously misleading in what they leave out. The College Student Experience Questionnaire, while straightforward, collects a substantial quantity of data about experiences of being a student at UC Davis. Considering the complexity of the college experience, it is not surprising that the results of this survey resist encapsulation.

Nevertheless, some basic points can be made. Students at UC Davis report levels of experience and gain similar to those reported by students at other doctoral granting universities. In general, those students who report higher levels of effort also report higher levels of gain from their college experiences. Different subpopulations report different levels of effort and different levels of gain: men differ from women, ethnic groups differ from one another, and students differ according to their fields of study.

These highlights single out the major findings of this study. In large, these findings have to do with differences among various subpopulations. Often, however, the absence of a difference may be as important as the presence of a difference; that such absences are present does not mean that such differences are unimportant.

Comparison of UC Davis and 25 doctoral granting universities (national norms)

UC Davis resembles the national norms for both the Quality of Effort that Davis students put into their undergraduate experience and the gains they estimate having made.

On those scales on which UC Davis students report a Quality of Effort (or frequency of activity) that is significantly different from the national norms, Davis students are higher.

Davis students report slightly smaller gains than the national norms in three areas: vocational training, information relevant to a career, and ability to learn on one's own.

Students at UC Davis report greater gains than those reported in the national norms in five areas: familiarity with the use of computers, awareness of different philosophies, understanding the nature of science, understanding new scientific and technological developments, and awareness of the consequences of science and technology.

The remainder of these highlights focus on differences among the responses of subgroups. Only those differences that may be generalized to the whole undergraduate population, differences that meet the .05-level significance test, are presented. Thus, we are 95% sure that these differences among respondents represent real differences among all undergraduates.

Men and Women

Controlling for the effects of age, class level, ethnicity, and field of study, men and women differ significantly from each other on only five Quality of Effort scales:

Women report greater effort on the course learning, experience in writing and personal experiences scales.

Men report greater effort on the athletic and recreation facilities and science/technology scales.

Also, controlling for the effects of age, class level, ethnicity, field of study, time spent working, time spent on academics, and quality of effort, men report greater gain than women in science and technology.

Ethnic groups

Controlling for the effects of age, sex, class level, and field of study, differences among ethnic groups are significant for six Quality of Effort scales. On four of these, Blacks report the greatest effort and on the other two, Whites. On all but one, Asians report the lowest Quality of Effort.

Blacks report the greatest effort on the experiences with faculty scale; Asians, followed closely by Whites, the least.

Blacks report the greatest effort on the clubs and organizations scale; Asians, the least.

Blacks report the greatest effort on the experience in writing scale; Chicanos, the least.

Blacks report the greatest effort on the personal experiences scale; Asians, followed by Whites, the least.

Whites report the greatest effort on the course learning scale; Asians, the least.

Whites report the greatest effort on the athletic and recreation facilities scale; Asians, the least.

Controlling for the effects of age, sex, class level, field of study, time spent working, time spent on academics, and quality of effort, differences in ethnicity are not significantly related to estimates of gain.

Class Level

Controlling for the effects of age, sex, ethnicity, and field of study, differences among class levels are significant for nine Quality of Effort scales. On seven of these, freshmen report the least effort.

Seniors, followed closely by sophomores and juniors, report the greatest effort on the experiences with faculty scale; freshmen, the least.

Seniors, followed closely by sophomores and juniors, report the greatest effort on the clubs and organizations scale; freshmen, the least.

Seniors report the greatest effort on the computer activities scale; sophomores and juniors, the least.

Seniors report the greatest effort on the topics of conversation scale; freshmen, the least.

Juniors, followed closely by sophomores and seniors, report the greatest effort on the student union scale; freshmen, the least.

Sophomores, followed closely by juniors and seniors, report the greatest effort on the library experiences scale; freshmen, the least.

Sophomores, followed by seniors and juniors, report the greatest effort on the art, music, and theater scale; freshmen, the least.

Sophomores report the greatest effort on the experience in writing scale; juniors, the least.

Sophomores, the greatest effort on the information in conversations scale; freshmen, the least.

Controlling for the effects of age, sex, ethnicity, field of study, time spent working, time spent on academics, and quality of effort, an increase in class level is associated with an increase in reported gain for three of five composite estimates of gain: science and technology, intellectual development, and vocational skills.

Field of Study

Controlling for the effects of age, sex, ethnicity, and class level, differences among field of study are significant for twelve Quality of Effort scales.

Students in agriculture report the greatest effort on the student union scale; students in engineering and computer science, the least.

Students in agriculture report the greatest effort on the clubs and organizations scale; students in engineering and computer science, followed by students in the arts and humanities, the least.

Students in agriculture report the greatest effort on the student acquaintances scale; students in engineering and computer science, the least.

Students in the arts and humanities report the greatest effort on the experience in writing scale; students in engineering and computer science, the least.

Students in the arts and humanities report the greatest effort on the experiences with faculty scale; students in engineering and computer science, followed closely by students in agriculture, the least.

Students in the arts and humanities report the greatest effort on the art, music and theater scale; students in engineering and computer science, followed closely by students in agriculture, the least.

Students in the physical sciences report the greatest effort on the library experiences scale; students in engineering and computer science, the least.

Students in the social sciences report the greatest effort on the personal experiences scale; students in engineering and computer science, followed by students in physical science, the least.

Students in the social sciences report the greatest effort on the topics of conversation scale; students in physical science, followed closely by students in engineering and computer science, the least.

Students in the social sciences report the greatest effort on the information in conversations scale; students in engineering and computer science, followed closely by students in physical science, the least.

Students in engineering and computer science, followed closely by students in the physical sciences, report the greatest effort on the science/technology scale; students in the arts and humanities, the least.

Students in engineering and computer science report the greatest effort on the computer activities scale; students in the arts and humanities, followed closely by students in the physical sciences, the least.

Controlling for the effects of age, sex, ethnicity, class level, time spent working, time spent on academics, and quality of effort, differences in field of study are associated with significantly different reported gains in science and technology, in intellectual development, and in vocational skills.

Composite Quality of Effort Factors

Controlling for the effects of age, sex, ethnicity, class level, field of study, time spent working, and time spent on academics, differences in quality of effort are associated with significantly different reported gains in personal development, in understanding science and technology, in general education, literature and the arts, and in intellectual development.

Increased gain in personal development is associated with increased effort on the composite Interpersonal Quality of Effort (art, music, theater; personal experiences; student acquaintances; topics of conversation; and information in conversations scales) and on the composite Group Facilities Quality of Effort (student union, athletic and recreation facilities, and clubs and organizations scales).

Increased gain in science and technology is associated with increased effort on the composite Science and Technology Quality of Effort scale. The more frequently one performs a science-related activity, the more understanding one gets of scientific principles and procedures.

Increased gain in general education, literature and the arts is positively associated with the composite Interpersonal Quality of Effort and the composite Academic Quality of Effort (library, faculty, course learning, and writing scales). It is negatively associated with Science and Technology Quality of Effort.

Increased gain in intellectual development is positively associated with the composite Academic Quality of Effort.

QUALITY OF EFFORT

It goes without saying that the quality of a student's experience depends in part upon what the student contributes to that experience. That contribution may be broken into entrance characteristics and performance characteristics, into what a student brings to the campus—academic preparation, study skills, motivation and the like—and what a student does after arriving—time spent studying, socializing, and the like. These two components are clearly related; one's academic preparation, for example, will have an effect on the amount of studying one will have to do in order to achieve particular levels of competency.

The relationship between academic preparation and academic performance has been the subject of considerable research, much of it sponsored by testing organizations and by admissions offices across the country. The College Student Experiences Questionnaire attempts to provide measures of the other side of the student contribution, the effort put forth by students after they have entered college. The approach taken is a variant of measuring time on task. Students are asked to report the frequency of performing particular activities during the current school year.

Activities are clustered into related groups of ascending difficulty or scales. Each scale is summarized by a single number that is calculated by assigning values to each response. A response of "Never" gets a value of one and "Occasionally," "Often" and "Very often" get two, three and four, respectively. The scale score is the unweighted sum of these values, with only students responding to all ten items being scored.

The library experiences scale, for example, includes ten items:

1. Used the library as a quiet place to read or study materials you brought with you.
2. Used the card catalogue to find what materials there were on some topic.
3. Asked the librarian for help in finding material on some topic.
4. Read something in the reserve book room or reference section.
5. Used indexes (such as the Reader's Guide to Periodical Literature) to journal articles.
6. Developed a bibliography or set of references for use in a term paper or other report.
7. Found some interesting material to read just by browsing in the stacks.
8. Ran down leads, looked for further references that were cited in things you read.
9. Used specialized bibliographies (such as Chemical Abstracts, Psychological Abstracts, etc.).
10. Gone back to read a basic reference or document that other authors had often referred to.

The maximum score for this scale is forty and the minimum, ten. The score on this scale, then, would be a measure of the Quality of Effort by the student in the use of the libraries, with a higher score indicating a greater Quality of Effort.

One can take one of two not altogether different approaches in examining these scales. Because the questionnaire asks students how often they have performed certain tasks—the items in the scales—the results may be interpreted in terms of frequencies of experiences. Reporting the results in this way would use language like "freshmen report fewer type-x experiences than sophomores." This behavioral approach underplays the dimensionality of the scales.

The second approach—the one most often taken in this report—treats the scales as measuring underlying dimensions of the college student experience. In this view, the frequency of activity indicates the degree or Quality of Effort put by the student into a component of college experience. Interpretations of the scales using this approach use language like "freshmen report a lower Quality of Effort on the type-x scale than sophomores."

As with all such scales, the Quality of Effort scale is an imperfect measure of the underlying dimension. For the scale to be useful, it must include the principal components of the dimension and the ruler used to measure each of the items must be reliable. If the responses mean substantively different things to different respondents in a systematic way, comparisons across groups become invalid. Studying this issue in his original work, Pace found that the meaning of response categories was related to content of the question but not to the demographic characteristics of the respondents within a single institution (Pace and Friedlander, 1981). The "Very often" response to "How often did you ask others to read something you wrote," for example, typically meant "about once or twice a month." The same response to "How often did you summarize points in readings or class notes," typically meant "about once a week." Accordingly, great caution should be used when comparing one Quality of Effort scale with another. This research also showed that, given the same topic, differences among groups within the same college are minor.

The data collected by the instrument include fifteen scales, two of which have subclusters. These are presented in Table 1 (over) along with the Quality of Effort reported by UC Davis respondents and, for comparison, the national norms collected from 25 doctoral granting institutions. Although the cases where the difference between the UC Davis score and the norm is statistically significant are marked with an asterisk (alpha = .05), in no case does the difference exceed two points and, after rounding the UC Davis means to the nearest tenth, in only three cases does it exceed one point. In each case, the Davis score is higher than the norm but these differences are so small as to be of little visible or practical import.

For example, the difference between UC Davis scores and the national norms on the Student Union Scale is 1.3; that this difference is statistically significant at the .05 level means that we are 95% sure that the true difference falls between 0.9 and 1.7. At the highest difference, 1.7, UC Davis respondents would only be reporting a 8.7%

greater Quality of Effort. It is unlikely that a decline of 8.7% on this scale would be noticed on the campus.

TABLE 1
MEAN QUALITY OF EFFORT REPORTED
UC DAVIS AND NATIONAL NORMS

	# of Items	UCD Mean	UCD sd	National Mean	National sd
Library Experiences Scale	10	18.82	4.65	18.5	4.8
Experiences with Faculty Scale	10	18.53	5.01	18.9	5.1
Course Learning Scale	10	29.24	5.15	29.1	5.0
Art, Music, Theater Scale	12	19.04	5.77	19.0	5.6
Art Scale	4	6.36	2.67		
Music Scale	4	7.04	2.45		
Theater Scale	4	5.70	2.03		
Student Union Scale	10	20.92*	6.00	19.6	5.9
Athletic and Recreation Facilities Scale	10	19.10*	7.18	17.9	6.5
Clubs and Organizations Scale	10	19.08	6.75	19.2	7.1
Experience in Writing Scale	10	25.76*	5.66	24.7	6.0
Personal Experiences Scale	10	22.37*	5.02	21.5	5.8
Student Acquaintances Scale	10	25.92*	6.36	24.5	6.4
Science/Technology Scale	8	16.40*	5.78	15.9	5.5
Science Principles Scale	4	9.71	3.39		
Science Procedures Scale	4	6.69	2.86		
Computer Activities Scale	4	7.68	2.93		
Dormitory or Fraternity/Sorority Scale	10	25.74	7.30	25.5	7.0
Topics of Conversation Scale	12	30.00*	5.48	29.1	5.9
Information in Conversations Scale	6	14.89*	3.27	14.4	3.1

*Difference in means is significant at alpha = .05.

These results suggest that Davis undergraduates substantially resemble those at the 25 doctoral granting institutions making up the national norms on those dimensions measured by the Quality of Effort scales. Nevertheless, it is worth pointing out that, although the differences are small, Davis students report significantly higher Quality of Effort on eight of the fifteen scales. Furthermore, six of the eight are scales that measure dimensions central to the mission of Student Affairs.

Of greater interest than comparisons with the national norms are questions about differences among the subgroups of Davis respondents. Do Asians, for example, report higher Quality of Effort than Chicanos? How do women compare with men? Because respondents fall into categories determined by multiple characteristics, it is not appropriate to simply compare subgroups. Instead, one must compare subgroups, holding the other variables constant. The following analysis looks at the effects of sex, age, class level, ethnicity, and field of study on each Quality of Effort scale, in each case holding for the effects of the other independent variables. The technique used is a form of regression whereby the independent variables are categorical. Those readers unused to interpreting regression tables may find the explanation in Appendix B helpful.

One must note that these measures are abstractions and do not translate into absolute levels of performance that are intuitively meaningful. Even so, higher scores

indicate more activities and, in general, higher Quality of Effort. Comparisons of mean scores across subgroups, between subgroups and UC Davis means, and between subgroups and national norms will convey a sense of how the subgroups view what they have put into their college experiences.

The following discussion largely ignores variation among the three age groups. At UC Davis most undergraduates are less than 23 so that differences of older undergraduates have only the smallest of effects on the campus. Should, however, the demographics change so that older students make up a larger proportion of the undergraduate population, those differences would become more important.

Library Experiences

The items in the library experiences scale range from routine activities of moderate utility to highly independent exploration and independent activities. Typical of the lower end of the scale are using the library as a place of study and using the card catalogue. Items on the higher end of the scale include using specialized bibliographies and following up citations in basic references and documents.

TABLE 2
QUALITY OF EFFORT: LIBRARY EXPERIENCES
REGRESSION COEFFICIENTS

Intercept	*19.147*	*ETHNICITY*	*(p = 0.245)*
AGE	*(p = 0.193)*	Whites	-0.479
Less than 23	-0.646	Blacks	0.677
23-27	0.035	Chicanos	-0.110
More than 27	0.000	Asians	-0.317
SEX	*(p = 0.871)*	Others	0.000
Male	-0.030	*FIELD OF STUDY*	*(p = 0.000)*
Female	0.000	Agriculture	0.020
CLASS LEVEL	*(p = 0.000)*	Arts/Humanities	0.881
Freshmen	-1.710	Physical Sciences	1.230
Sophomores	0.373	Social Sciences	0.585
Juniors	0.129	Engineering/Computer Sci	-1.955
Seniors	0.000	Others	0.000
N:	693	**RANGE**	10-40
MULTIPLE R:	.348	**UC DAVIS MEAN**	18.82
SQUARED MULTIPLE R:	.121	**NATIONAL NORM**	18.5

As revealed in Table 2, class level and major field are associated with significant differences in the levels reported on this scale. Freshmen report lower Quality of Effort than the other three classes in library activities and sophomores the highest. The variations associated with age, sex and ethnicity are not statistically significant.

Freshmen stand out with their lower Quality of Effort on this scale; at the same time the other three classes are very close together. This pattern suggests that the first year is different in kind from the rest of a student's academic career. Freshmen are more likely than other students to live in residence halls and thus are more likely to be able to return to their living quarters between classes. Accordingly, freshmen may depend less than their more advanced peers on the library as a quiet place for study. Freshmen are also less likely to be assigned research projects.

The library experiences scale effectively discriminates between students in applied areas like engineering and agriculture and students in other areas. Thus, for example, students in engineering and computer science report substantially lower scores on this scale than other students. Studies in these areas are more likely to emphasize research using computers and laboratories than library resources. In addition, engineering texts are particularly likely to be self-contained and engineering faculty seldom assign reserved book reading.

Experiences with Faculty

At the bottom end of the experiences with faculty scale are such casual contacts as talking with a member of the faculty and asking for additional information about course work. The upper end of the scale includes items that involve greater initiative on the part of the student, items that are in some sense more serious. These include working with a faculty member on a research project and discussing personal problems with a faculty member.

As Table 3 (over) reveals, Quality of Effort for experiences with faculty reported by Davis students varies significantly by class level, ethnicity, and field of study: freshmen report lower levels than more advanced students, Blacks higher levels than other ethnic groups, and so forth. As with library experiences, freshmen differ significantly from more advanced students, reporting a lower Quality of Effort. A number of features of the freshman year may contribute to this phenomenon, including the fact that the courses freshmen take are especially likely to be taught by graduate students, reducing their opportunities to interact with faculty.

Explanations for the differences by major field, however, are less obvious. Students in the arts and humanities report the highest level of effort on this scale while students in engineering and computer science report the lowest, followed by students in agriculture. The higher score for students in the arts and humanities may come as a result of the kind of relationship that develops when a student's academic work involves writing papers, essay exams, or preparing works of art for faculty comment. Such activities are more likely to invite direct personal contact than activities associated with tests that are graded by computer or teaching assistant. Put another way, it may be easier for a student to interact with faculty in the arts and humanities than in other fields.

TABLE 3
QUALITY OF EFFORT: EXPERIENCES WITH FACULTY
REGRESSION COEFFICIENTS

Intercept	*18.976*	*ETHNICITY*	*(p = 0.039)*
AGE	*(p = 0.534)*	Whites	-0.663
Less than 23	-0.215	Blacks	0.941
23-27	-0.466	Chicanos	0.028
More than 27	0.000	Asians	-0.756
SEX	*(p = 0.341)*	Others	0.000
Male	-0.196	*FIELD OF STUDY*	*(p = 0.013)*
Female	0.000	Agriculture	-1.017
CLASS LEVEL	*(p = 0.000)*	Arts/Humanities	1.042
Freshmen	-1.148	Physical Sciences	-0.086
Sophomores	-0.013	Social Sciences	0.053
Juniors	-0.220	Engineering/Computer Sci	-1.161
Seniors	0.000	Others	0.000
N:	690	**RANGE**	10-40
MULTIPLE R:	.272	**UC DAVIS MEAN**	18.53
SQUARED MULTIPLE R:	.074	**NATIONAL NORM**	18.9

Most surprising of all are the differences by ethnicity. Blacks report by far the highest Quality of Effort while Asians report the lowest, followed closely by Whites. This scale, like the other Quality of Effort scales, reflects frequency of activity. Accordingly, the results suggest that Blacks perceive themselves as engaging faculty on a one-to-one level more often than other students.

Course Learning

Items in the course learning scale range from such relatively simple activities as note taking and listening attentively to such more difficult tasks as making class outlines and doing independent reading. The dimension measured by this scale may be thought of as the degree of engagement of students in their coursework.

Students vary significantly on this scale by sex and ethnicity. Table 4 (over) presents the complete set of regression coefficients. The table shows that men report lower Quality of Effort for course learning than women.

As with experiences with faculty, Asian students report the lowest Quality of Effort in course learning. These results are somewhat surprising and we may speculate, for example, why Asians, who have the highest graduation rates of any ethnic group, report the lowest Quality of Effort in course learning.

The absence of significant difference by class level, particularly past the freshman year, is itself an interesting finding. It suggests that Davis undergraduates establish their level of effort early in their academic careers and stay with that level throughout.

It also suggests that, insofar as Quality of Effort in course work is driven by the level of difficulty in courses taken, courses taken by seniors are no more difficult for them than courses taken by sophomores are for them.

TABLE 4
QUALITY OF EFFORT: COURSE LEARNING
REGRESSION COEFFICIENTS

Intercept	*29.210*	*ETHNICITY*	*(p = 0.019)*
AGE	*(p = 0.152)*	Whites	1.027
Less than 23	-0.660	Blacks	0.253
23-27	-0.523	Chicanos	0.308
More than 27	0.000	Asians	-0.463
SEX	*(p = 0.001)*	Others	0.000
Male	-0.703	*FIELD OF STUDY*	*(p = 0.963)*
Female	0.000	Agriculture	-0.216
CLASS LEVEL	*(p = 0.129)*	Arts/Humanities	0.244
Freshmen	-0.706	Physical Sciences	-0.039
Sophomores	0.041	Social Sciences	0.131
Juniors	0.007	Engineering/Computer Sci	-0.347
Seniors	0.000	Others	0.000
N:	687	**RANGE**	10-40
MULTIPLE R:	.252	**UC DAVIS MEAN**	29.24
SQUARED MULTIPLE R:	.063	**NATIONAL NORM**	29.1

Art, Music, Theater

This scale may be decomposed into three parts, one each for art, music, and theater. The components have the same structure, with the lowest level activity being talking about the subject and the highest level, participating in making art, music, or drama. Each sub-scale is independent so the final score is the result of adding three separate, but related, scales. This feature differentiates this scale from the others reported here.

Variation in the Quality of Effort in art, music, and theater is significantly associated with age, class level, and field of study. Table 5 (over) presents the results of regressing Quality of Effort in art, music, and theater on age, sex, class level, ethnicity, and field of study.

Freshmen are particularly likely to have their lives filled by activities related to adjusting to college life. Accordingly, it is not surprising to find them reporting lower scores on this scale; they simply have less time for activities in the arts. Reasons for the other differences by class level are hard to come by. It is possible that the slight bulge in the sophomore year comes in compensation for the deprivation during the freshman year. Then having, as it were, overindulged, students settle down for their junior and senior years.

TABLE 5
QUALITY OF EFFORT: ART, MUSIC, THEATER
REGRESSION COEFFICIENTS

Intercept	*18.238*		
AGE	*(p = 0.005)*	Whites	0.413
Less than 23	1.011	Blacks	-0.043
23-27	-1.026	Chicanos	-0.517
More than 27	0.000	Asians	-1.049
SEX	*(p = 0.990)*	Others	
Male	-0.003	*FIELD OF STUDY*	*(p = 0.000)*
Female	0.000	Agriculture	-1.256
CLASS LEVEL	*(p = 0.013)*	Arts/Humanities	2.996
Freshmen	-1.136	Physical Sciences	-0.728
Sophomores	0.702	Social Sciences	-0.704
Juniors	-0.116	Engineering/Computer Sci	-1.536
Seniors	0.000	Others	0.000
N:	656	**RANGE**	12-48
MULTIPLE R:	.334	**UC DAVIS MEAN**	19.04
SQUARED MULTIPLE R:	.112	**NATIONAL NORM**	19.0
ETHNICITY	*(p = 0.059)*		

The differences among the fields of study hold few surprises. Students in the arts and humanities score highest on this scale; those in engineering and computer science, the lowest. The high level of activity reported by those in arts and humanities include the scores reported by students majoring in art, music, and drama. Students in engineering, on the other hand, treat such activities as part of their leisure and so have less time for them.

Student Union

As with the other scales, the student union scale runs from casual and informal use to programmatic use. Examples of the former are having meals or snacks at the union and looking at the bulletin board for notices about campus events. Programmatic use includes playing games available in the union and using the lounges or meeting rooms to meet with others for a discussion. The higher level items represent making a fuller use of the potential of the union.

There are striking differences between the mean scores on this scale by class level and less striking differences among the fields of study. The differences in the other variables, excepting age, are not statistically significant. Table 6 (over) presents the complete set of regression coefficients for this Quality of Effort scale.

Although the difference between men and women on this scale is moderately large, it is not statistically significant. One cannot confidently generalize that the difference found in the sample will be found in the whole undergraduate population.

TABLE 6
QUALITY OF EFFORT: STUDENT UNION
REGRESSION COEFFICIENTS

Intercept	*19.847*	*ETHNICITY*	*(p = 0.468)*
AGE	*(p = 0.000)*	Whites	-0.260
Less than 23	1.799	Blacks	0.285
23-27	-1.289	Chicanos	0.507
More than 27	0.000	Asians	-0.767
SEX	*(p = 0.337)*	Others	0.000
Male	-0.235	*FIELD OF STUDY*	*(p = 0.013)*
Female	0.000	Agriculture	1.717
CLASS LEVEL	*(p = 0.000)*	Arts/Humanities	-0.036
Freshmen	-2.330	Physical Sciences	-0.542
Sophomores	0.185	Social Sciences	0.416
Juniors	0.272	Engineering/Computer Sci	-1.773
Seniors	0.000	Others	0.000
N:	681	**RANGE**	10-40
MULTIPLE R:	.316	**UC DAVIS MEAN**	20.92
SQUARED MULTIPLE R:	.100	**NATIONAL NORM**	19.6

The differences across class levels are both substantial and statistically significant. Freshmen report lower Quality of Effort than sophomores, juniors, and seniors. Some of this difference is no doubt the product of the fact that freshmen are especially likely to live in residence halls and are thus less dependent upon the union as a place to gather, study, and relax. In addition, students in the residence halls find a full panoply of residence hall services and programs offered by residence hall staff. Those inclined to avail themselves of such activities need seek no further than their places of residence.

Athletic and Recreation Facilities

The easiest items on the athletic and recreation facilities scale include goal setting for some physical skill and following a regular exercise schedule. At the highest level is participation in a varsity sport. The general direction of the scale is from the casual, informal, and individual use of athletic and recreation facilities to more formal efforts toward improvement and skilled performance, including participating in group activities. While the activities in this scale include intercollegiate sports, they do not dominate it. Accordingly, it is one of several measures of social integration.

Four of the five independent variables—age, sex, ethnicity and field of study—are associated with a significantly different mean reported Quality of Effort on the athletic and recreation activities scale. The results of the regression analysis for this scale are presented in Table 7 (over).

TABLE 7
QUALITY OF EFFORT: ATHLETIC AND RECREATION FACILITIES
REGRESSION COEFFICIENTS

Intercept	*17.227*		
AGE	*(p = 0.000)*	Whites	1.332
Less than 23	2.561	Blacks	-0.120
23-27	0.116	Chicanos	0.300
More than 27	0.000	Asians	-1.256
SEX	*(p = 0.000)*	Others	0.000
Male	1.747	*FIELD OF STUDY*	*(p = 0.000)*
Female	0.000	Agriculture	3.247
CLASS LEVEL	*(p = 0.054)*	Arts/Humanities	-1.129
Freshmen	1.245	Physical Sciences	0.943
Sophomores	-0.082	Social Sciences	-0.605
Juniors	-0.702	Engineering/Computer Sci	-2.041
Seniors	0.000	Others	0.000
N:	680	**RANGE**	10-40
MULTIPLE R:	.407	**UC DAVIS MEAN**	19.10
SQUARED MULTIPLE R:	.165	**NATIONAL NORM**	17.9
ETHNICITY	*(p = 0.012)*		

Only the variation among class levels is not statistically significant. That men report a higher Quality of Effort on an athletics and recreation scale (1.75) is in keeping with the widely held, if misleading, notion that men are "more athletic" than women. More surprising are the differences among the ethnic groups. Whites report substantially higher Quality of Effort than other ethnic groups and Asians, substantially lower. The variation among students in different fields of study, however, is both large and difficult to interpret.

Clubs and Organizations

The Clubs and Organizations scale ranges from activities showing general awareness of events and organizations to active participation. At the bottom of the scale is looking for notices about campus events and organizations and attending programs and campus events. Working on a committee and meeting with a faculty advisor or administrator to discuss a student organization are at the top of the scale.

Table 8 (over) contains the results of the regression analysis for this scale. Differences on this scale among age, class levels and the five ethnic groups are significant.

The difference between men and women (.318) is not statistically significant; neither are the differences among the fields of study.

Freshmen are particularly likely to live in the residence halls, which have active programs to take up their free time. This would help explain the lower Quality of Effort reported on this scale by freshmen. In addition, more advanced students are more

likely to be familiar with the broad range of clubs and organizations on the campus and thus be more likely to participate in the activities offered by them. The substantial difference between the two ethnic groups at the extremes, Blacks at the high end and Asians at the low, is not easily explained. The phenomenon invites further investigation.

TABLE 8
QUALITY OF EFFORT: CLUBS AND ORGANIZATIONS
REGRESSION COEFFICIENTS

Intercept	*17.790*		
AGE	*(p = 0.000)*	Whites	-0.667
Less than 23	2.462	Blacks	2.142
23-27	-1.674	Chicanos	0.955
More than 27	0.000	Asians	-1.418
SEX	*(p = 0.255)*	Others	0.000
Male	-0.318	*FIELD OF STUDY (p = 0.682)*	
Female	0.000	Agriculture	1.084
CLASS LEVEL	*(p = 0.000)*	Arts/Humanities	-0.218
Freshmen	-1.967	Physical Sciences	0.176
Sophomores	-0.216	Social Sciences	0.067
Juniors	-0.280	Engineering/Computer Sci	-0.833
Seniors	0.000	Others	0.000
N:	679	**RANGE**	10-40
MULTIPLE R:	.326	**UC DAVIS MEAN**	19.08
SQUARED MULTIPLE R:	.107	**NATIONAL NORM**	19.2
ETHNICITY	*(p = 0.000)*		

Experience in Writing

At the lowest end of the experience in writing scale are such items as using a dictionary or thesaurus and thinking systematically about grammar and sentence structure. The higher level items include submitting something for publication. The items go from general concern about the mechanics of writing to a greater concern about clarity and style. The activities at the top of the scale open the student to criticism by others and are in that sense more difficult than items at the lower end.

Table 9 (over) presents the coefficients produced by regressing Quality of Effort in writing on age, sex, class level, ethnicity, and field of study. Variation in the number of writing experiences, in the Quality of Effort in writing, is significantly associated with sex, class level, ethnicity, and field of study.

The predicted scores for females are 0.859 greater than those for their male counterparts. This means that, even after controlling for the effects of age, class level, ethnicity, and field of study, women have more writing experiences than men. On each of the ten items that make up this scale except the last, women are significantly more likely than men to report they did the activity often or very often.

TABLE 9
QUALITY OF EFFORT: EXPERIENCE IN WRITING
REGRESSION COEFFICIENTS

Intercept	*26.394*	*ETHNICITY*	*(p = 0.023)*
AGE	*(p = 0.086)*	Whites	0.045
Less than 23	-0.949	Blacks	1.352
23-27	0.130	Chicanos	-0.056
More than 27	0.000	Asians	0.379
SEX	*(p = 0.000)*	Others	0.000
Male	-0.859	*FIELD OF STUDY (p = 0.013)*	
Female	0.000	Agriculture	0.812
CLASS LEVEL	*(p = 0.007)*	Arts/Humanities	1.497
Freshmen	0.377	Physical Sciences	-0.387
Sophomores	1.089	Social Sciences	-0.050
Juniors	-1.000	Engineering/Computer Sci	-1.445
Seniors	0.000	Others	0.000
N:	690	**RANGE**	10-40
MULTIPLE R:	.293	**UC DAVIS MEAN**	25.76
SQUARED MULTIPLE R:	.086	**NATIONAL NORM**	24.7

The differences by class level are also striking. They suggest that most writing experiences come while students are still in lower division courses. It is of course possible that more advanced students rely less on reference works and the criticism of others; this would lower their scores on this scale.

Personal Experiences

The personal experiences scale includes items ranging from those entailing a general sense of self-awareness and understanding of others to items requiring more focused and expertly formed sources of such knowledge. Easiest activities include explaining one's actions to friends and discussing group behavior with other students. The more difficult activities include actively participating in group sessions where individuals talk about personal problems and discussing such problems with a counselor or other specialist.

The coefficients produced by regressing Quality of Effort in personal experiences on age, sex, class level, ethnicity, and field of study are presented in Table 10 (over). Women report significantly higher Quality of Effort on this scale; the mean scores for females are 1.298 higher than those of their male counterparts. Differences among fields of study and age are also significant.

Students majoring in the social sciences score highest on this scale and those in engineering and the computer sciences score the lowest. Part of the explanation for the high scores in the social sciences resides in the fact that three items on the scale ask about activities common in the social sciences: taking courses that deal with understanding personal or social behavior; reading articles about personality adjust-

ment or personality development; and taking tests to measure abilities, interests, or attitudes. The reasons for the lower scores of those in engineering and the physical sciences are less obvious.

TABLE 10
QUALITY OF EFFORT: PERSONAL EXPERIENCES
REGRESSION COEFFICIENTS

Intercept	*21.158*	*ETHNICITY*	*(p = 0.891)*
AGE	*(p = 0.017)*	Whites	0.100
Less than 23	1.268	Blacks	0.321
23-27	-0.138	Chicanos	-0.147
More than 27	0.000	Asians	-0.423
SEX	*(p = 0.000)*	Others	0.000
Male	-1.298	*FIELD OF STUDY*	*(p = 0.000)*
Female	0.000	Agriculture	0.542
CLASS LEVEL	*(p = 0.280)*	Arts/Humanities	1.045
Freshmen	0.232	Physical Sciences	-1.058
Sophomores	0.608	Social Sciences	1.714
Juniors	-0.601	Engineering/Computer Sci	-2.033
Seniors	0.000	Others	0.000
N:	688	**RANGE**	10-40
MULTIPLE R:	.382	**UC DAVIS MEAN**	22.37
SQUARED MULTIPLE-R:	.146	**NATIONAL NORM**	21.5

Student Acquaintances

Items of the student acquaintances scale break into groups of six and four. The first group deals with making friends with individuals from different backgrounds and interests. One item from it asks about making friends with students whose family background differs. The other group consists of items concerning having serious discussions with individuals with attitudes and values different from those of the respondent. A typical item from this group asks about having a serious discussion with students from a country different from that of the respondent.

Several factors can contribute to high and low score levels on this scale. Students from subpopulations who make up the largest proportions of the undergraduate student body will have fewer opportunities to make friends with students of different backgrounds than students in subpopulations that are relatively small. A student who sees most fellow students as coming from different backgrounds is likely to score higher on this scale than a student who sees most fellow students as being similar. Assuming that it is easier to make acquaintances with those who are like oneself than with those who are different, the scale measures the barriers to integration as well as the effort to overcome those barriers.

The mean Quality of Effort on the student acquaintances scale differs significantly by ethnicity and field of study. Differences between the sexes, among class levels and

age groups are too small to be statistically significant. Table 11 presents the regression coefficients for this scale.

TABLE 11
QUALITY OF EFFORT: STUDENT ACQUAINTANCES
REGRESSION COEFFICIENTS

Intercept	*26.385*	*ETHNICITY*	*(p = 0.001)*
AGE	*(p = 0.269)*	Whites	-0.823
Less than 23	0.595	Blacks	2.028
23-27	-0.632	Chicanos	0.230
More than 27	0.000	Asians	-1.260
SEX	*(p = 0.965)*	Others	0.000
Male	-0.012	*FIELD OF STUDY*	*(p = 0.010)*
Female	0.000	Agriculture	1.191
CLASS LEVEL	*(p = 0.326)*	Arts/Humanities	0.707
Freshmen	0.370	Physical Sciences	-0.339
Sophomores	0.602	Social Sciences	0.465
Juniors	-0.627	Engineering/Computer Sci	-2.261
Seniors	0.000	Others	0.000
N:	692	**RANGE**	10-40
MULTIPLE R:	.253	**UC DAVIS MEAN**	25.92
SQUARED MULTIPLE R:	.064	**NATIONAL NORM**	24.5

The high scores of Blacks on this scale stand out. This effect may result in part from the sense of isolation expressed in other contexts by Black students (see Low, 1988). The low scores of Asians, on the other hand, may suggest that they are especially likely to associate with students of like background and that they sense that they, as a group, have a place in the institution. Alternatively, Asian students may focus more on their academic activities and less on the kind of social activities that would increase their scores on this scale.

Students in engineering and computer science score substantially lower on this scale than students in other majors, suggesting that they put less effort into developing diverse acquaintances than other students. Perhaps their attention is more narrowly focused on their academic careers than students in other fields. If this is the case and if the lower scores in this area are regarded as shortcomings, the campus may wish to develop programs to assist students in these areas develop their interpersonal skills.

Science/Technology

The activities asked about in the science and technology section of the questionnaire fall into two segments: the first four questions deal with understanding scientific principles and relationships; the second four, with scientific methods and procedures. The underlying dimension may be thought of as going from memorizing to experimenting and explaining.

Table 12 presents the complete results of the regression analysis. The mean scores on the science and technology scale differ significantly by sex—men score 0.558 higher on this scale than women—and, not surprisingly, by field of study.

TABLE 12
QUALITY OF EFFORT: SCIENCE/TECHNOLOGY
REGRESSION COEFFICIENTS

Intercept	*15.832*	*ETHNICITY*	*(p = 0.918)*
AGE	*(p = 0.641)*	Whites	0.117
Less than 23	0.124	Blacks	-0.265
23-27	0.362	Chicanos	-0.116
More than 27	0.000	Asians	0.212
SEX	*(p = 0.002)*	Others	0.000
Male	0.558	*FIELD OF STUDY*	*(p = 0.000)*
Female	0.000	Agriculture	-0.267
CLASS LEVEL	*(p = 0.559)*	Arts/Humanities	-4.259
Freshmen	-0.315	Physical Sciences	3.971
Sophomores	-0.073	Social Sciences	-2.826
Juniors	0.379	Engineering/Computer Sci	4.599
Seniors	0.000	Others	0.000
N:	684	**RANGE**	8-32
MULTIPLE R:	.657	**UC DAVIS MEAN**	16.40
SQUARED MULTIPLE R:	.432	**NATIONAL NORM**	15.9

That students in engineering, computer science and the physical sciences should top this scale comes as no surprise. The activities on this scale are exactly those that students in the sciences may reasonably be expected to do often or very often.

Dormitory or Fraternity/Sorority

At the bottom of the dormitory or fraternity/sorority scale are such items about general socializing as having lively conversations about various topics during dinner. Items at the top of the scale deal with more organized activities, such as working on some community service or fund raising project with others from the living unit. The scale rests on the assumption that the latter kind of involvement indicates greater effort on the part of the student.

Fewer than half of the respondents responded to all the items on this scale. This phenomenon is not unique to UC Davis but applies to the national norms as well. This implies that Davis shares with the institutions in the norms the fact that substantial proportions of the student bodies do not live in college affiliated housing.

Table 13 (over) presents the regression coefficients for this scale. Only the differences among the three age groups (the youngest report the highest level of effort) and among fields are significant.

TABLE 13
QUALITY OF EFFORT: DORMITORY OR FRATERNITY/SORORITY
REGRESSION COEFFICIENTS

Intercept	*20.847*	**ETHNICITY**	**(p = 0.128)**
AGE	*(p = 0.003)*	Whites	1.450
Less than 23	5.329	Blacks	-0.865
23-27	0.226	Chicanos	-0.249
More than 27	0.000	Asians	-1.324
SEX	*(p = 0.459)*	Others	0.000
Male	-0.326	*FIELD OF STUDY*	*(p = 0.047)*
Female	0.000	Agriculture	1.114
CLASS LEVEL	*(p = 0.125)*	Arts/Humanities	-1.975
Freshmen	-0.770	Physical Sciences	-1.109
Sophomores	-1.284	Social Sciences	1.939
Juniors	-0.247	Engineering/Computer Sci	-1.026
Seniors	0.000	Others	0.000
N:	289	**RANGE**	10-40
MULTIPLE R:	.356	**UC DAVIS MEAN**	25.74
SQUARED MULTIPLE R:	.127	**NATIONAL NORM**	25.5

Topics of Conversation

The set of items included in the topics of conversation scale go from topics of immediate experience to broader intellectual and cultural topics. Items at the personal end of the scale include discussing job prospects, money, and careers. The more global end includes discussing social and ethical issues related to science and technology. Clearly, the scale ranges from the casual to the serious.

TABLE 14
QUALITY OF EFFORT: TOPICS OF CONVERSATION
REGRESSION COEFFICIENTS

Intercept	*28.726*	Whites	-0.176
AGE	*(p = 0.000)*	Blacks	1.158
Less than 23	1.950	Chicanos	0.235
23-27	0.008	Asians	-0.840
More than 27	0.000	Others	0.000
SEX	*(p = 0.443)*	*FIELD OF STUDY*	*(p = 0.049)*
Male	0.177	Agriculture	-0.334
Female	0.000	Arts/Humanities	-0.109
CLASS LEVEL	*(p = 0.002)*	Physical Sciences	-0.919
Freshmen	-0.821	Social Sciences	0.709
Sophomores	-0.315	Engineering/Computer Sci	-0.444
Juniors	-0.300	Others	0.000
Seniors	0.000		
		RANGE	12-48
N:	684	**UC DAVIS MEAN**	30.00
MULTIPLE R:	.261	**NATIONAL NORM**	29.1
SQUARED MULTIPLE R:	.068		
ETHNICITY	*(p = 0.103)*		

The differences among age, class levels and those among fields of study are significant. Table 14 (previous page) presents results of regressing the Quality of Effort scale on age, sex, class level, ethnicity, and field of study.

Students majoring in the social sciences report the greatest Quality of Effort on this scale and students in the physical sciences, the lowest. These results are in keeping with the nature of the scale. Half of the twelve items on the scale relate to cultural issues, while only two deal with issues associated with modern science and technology. Accordingly, the differences among students in different majors fit differences implicit in the scale itself.

A subscale of items dealing with topics of immediate personal/social experiences reveals a similar distribution among the major fields, with those in the social sciences reporting the highest scores and those in the engineering and computer science, the lowest. Those in the physical sciences report only slightly greater Quality of Effort than those in engineering. It may be that students in engineering and computer and physical sciences spend less time than other students in social conversation.

Information in Conversations

Items in the information in conversation scale begin with casual activities like referring to knowledge gained from reading. The top end of the scale includes asking about persuading others to change their minds as a result of knowledge cited by the respondent. The latter portion of the scale attempts to get at using expertise, knowledge and persuasiveness developed at the institution.

Table 15 presents the regression coefficients for this Quality of Effort Scale. Only differences among class levels are statistically significant; freshmen and juniors report lower scores than seniors and sophomores.

TABLE 15
QUALITY OF EFFORT: INFORMATION IN CONVERSATIONS
REGRESSION COEFFICIENTS

Intercept	*15.050*	*ETHNICITY*	*(p = 0.100)*
AGE	*(p = 0.353)*	Whites	0.042
Less than 23	-0.192	Blacks	0.713
23-27	-0.405	Chicanos	0.101
More than 27	0.000	Asians	-0.022
SEX	*(p = 0.630)*	Others	0.000
Male	0.067	*FIELD OF STUDY*	*(p = 0.234)*
Female	0.000	Agriculture	0.128
CLASS LEVEL	*(p = 0.020)*	Arts/Humanities	0.173
Freshmen	-0.500	Physical Sciences	-0.113
Sophomores	0.243	Social Sciences	0.545
Juniors	-0.280	Engineering/Computer Sci	-0.309
Seniors	0.000	Others	0.000
N:	690	**RANGE**	6-24
MULTIPLE R:	.201	**UC DAVIS MEAN**	14.89
SQUARED MULTIPLE R:	.041	**NATIONAL NORM**	14.4

QUALITY OF EFFORT: FACTORS

The Quality of Effort scales can be thought of as clustering about four dimensions. In the analysis of national data (see Appendix B, Table B-2, for the results of a factor analysis of UC Davis data) these dimensions or factors are:

Academic Experiences:	Library Experiences
	Experiences with Faculty
	Course Learning
	Experience in Writing
Science & Computer Experiences:	Science/Technology
	Computer Experiences
Interpersonal Experiences:	Art, Music, Theater
	Personal Experiences
	Student Acquaintances
	Topics of Conversation
	Information in Conversations
Experiences with Group Facilities:	Student Union
	Athletic and Recreation Facilities
	Clubs and Organizations

(*Pace, 1987*)

The individual scales are interesting in themselves; the aggregated dimensions make it easy to identify patterns among the sub-populations. The same sort of regression as was done with the individual scales can be done using these four dimensions as the dependent variables. The results of such an examination reveal the broad differences among the various subpopulations.

Academic Experiences Factor

Table 16 (over) presents the result of regressing Academic Experiences on age, sex, class level, ethnicity, and major field. Differences by sex, class level, and field of study are significant.

Women report a slightly higher Quality of Effort along this dimension than men; freshmen report a lower Quality of Effort than their more advanced colleagues. The latter difference is not surprising: freshmen stand out from the other three class levels, which are tightly grouped, on the four scales that make up the academic experiences dimension. Except for writing experiences, for which freshmen report higher scores than juniors and seniors, freshmen report lower Quality of Effort than more advanced students. There are several possible explanations for this. Freshmen are often advised to take lighter workloads than more advanced students. This being so, the required investment in academic activities is going to be lighter. Additionally, freshmen course lists are unlikely to be dominated by courses requiring intensive library research and more likely to have a high proportion of courses taught by graduate students. Both of these factors will contribute to lower scores on the first three scales of the academic experiences dimension.

TABLE 16
QUALITY OF EFFORT: ACADEMIC EXPERIENCES
REGRESSION COEFFICIENTS

Intercept	*93.803*	*ETHNICITY*	*(p = 0.099)*
AGE	*(p = 0.051)*	Whites	-0.022
Less than 23	-2.796	Blacks	3.503
23-27	-0.772	Chicanos	0.146
More than 27	0.000	Asians	-1.053
SEX	*(p = 0.005)*	Others	0.000
Male	-1.694	*FIELD OF STUDY*	*(p = 0.004)*
Female	0.000	Agriculture	-1.000
CLASS LEVEL	*(p = 0.002)*	Arts/Humanities	3.637
Freshmen	-3.174	Physical Sciences	0.895
Sophomores	1.399	Social Sciences	0.644
Juniors	-0.992	Engineering/Computer Sci	-5.011
Seniors	0.000	Others	0.000
N:	661	**MULTIPLE R:**	.318
RANGE:	40-160	**SQUARED MULTIPLE R:**	.101

One of the most surprising results is that scores differ significantly by fields of study. Students in the arts and humanities report the highest quality of effort along this dimension while students in engineering and computer science report the lowest. These differences appear to be an artifact of the scale itself, which favors activities common among students in the humanities and, relatively speaking, uncommon among engineers and computer scientists.

The variance among the five ethnic groups is not significant; nevertheless, the difference between Blacks and the other ethnic groups is striking. In fact, an analysis that dichotomizes ethnicity into Black and non-Black reveals a statistically significant difference; controlling for age, sex, class level, and major field, Blacks report scores that are, on average, 1.946 higher than those of non-Blacks on this scale (p = 0.013).

Blacks also stand out on three of the four academic experiences scales. On all but experiences in courses (on which they are below only Chicanos), Blacks report the highest Quality of Effort of any ethnic group. Because the activities that make up these scales should be related to academic performance and because Blacks have the lowest graduation rates of any ethnic group, these results are provocative. Two possible explanations suggest themselves:

Insofar as high school grade point averages, SAT scores, or even whether or not the student meets eligibility requirements measure academic preparation, Blacks as a group are the least well prepared of any ethnic group. This being so, Blacks may perform the activities on the academic experience scales more frequently in order to compensate for under-preparation.

Blacks report greater dissatisfaction with racial harmony than other ethnic groups. Presuming that this dissatisfaction indicates that they perceive more racism on the campus, they may have to put in extra effort in order to compensate for the effects of this greater perceived barrier.

Whatever the reason for the greater Quality of Effort reported by Blacks, the fact remains that they see themselves as putting substantial effort into their education.

Science and Computer Experiences Factor

Table 17 presents the results of regressing Science and Computer Experiences on age, sex, class level, ethnicity, and field of study. The coefficients for sex and field of study vary significantly.

TABLE 17
QUALITY OF EFFORT: SCIENCE AND COMPUTER EXPERIENCES
REGRESSION COEFFICIENTS

Intercept	*23.555*	*ETHNICITY*	*(p = 0.479)*
AGE	*(p = 0.961)*	Whites	0.486
Less than 23	0.060	Blacks	-0.104
23-27	0.143	Chicanos	-0.623
More than 27	0.000	Asians	0.220
SEX	*(p = 0.019)*	Others	0.000
Male	0.571	*FIELD OF STUDY*	*(p = 0.000)*
Female	0.000	Agriculture	-0.023
CLASS LEVEL	*(p = 0.276)*	Arts/Humanities	-5.373
Freshmen	-0.318	Physical Sciences	3.454
Sophomores	-0.438	Social Sciences	-3.275
Juniors	-0.002	Engineering/Computer Sci	7.119
Seniors	0.000	Others	0.000
N:	645	**MULTIPLE R:**	.625
RANGE:	12-48	**SQUARED MULTIPLE R:**	.390

Even controlling for the effects of age, class level, ethnicity, and field of study, men report more experiences on this scale than women. However, the difference, while statistically significant, is not substantial. How insubstantial the variance is is revealed by examining the differences among fields of study. The spread between the smallest coefficient, arts and humanities (-5.373), and the largest, engineering and computer science (7.119), is more than twenty-one times the size of the spread between men and women (0.571).

Interpersonal Experiences Factor

Table 18 (over) presents the coefficients produced by regressing the Interpersonal Experiences factor on age, sex, class level, ethnicity, and field of study. Only the coefficients for age and field of study vary significantly.

On four of the five scales making up the Interpersonal Experiences factor, students in engineering and computer science score significantly below students in the other fields. Students in the arts and humanities and, to a lesser extent, in the social sciences score highly on this scale.

TABLE 18
QUALITY OF EFFORT: INTERPERSONAL EXPERIENCES
REGRESSION COEFFICIENTS

Intercept	*110.167*	*ETHNICITY*	*(p = 0.109)*
AGE	*(p = 0.034)*	Whites	-0.790
Less than 23	3.781	Blacks	4.017
23-27	-2.189	Chicanos	-0.680
More than 27	0.000	Asians	-3.808
SEX	*(p = 0.373)*	Others	0.000
Male	-0.774	*FIELD OF STUDY*	*(p = 0.003)*
Female	0.000	Agriculture	-1.140
CLASS LEVEL	*(p = 0.169)*	Arts/Humanities	3.708
Freshmen	-1.172	Physical Sciences	-2.995
Sophomores	2.211	Social Sciences	2.975
Juniors	-2.319	Engineering/Computer Sci	-5.759
Seniors	0.000	Others	0.000
N:	596	**MULTIPLE R:**	.274
RANGE:	50-200	**SQUARED MULTIPLE R:**	.075

As was the case with the academic factor, the coefficients for the five ethnic groups do not vary significantly. Once again, however, the coefficient for Blacks stands out. Breaking ethnicity into a Black/non-Black dichotomy reveals that Blacks report a 2.563 ($p < .05$) higher Quality of Effort on this scale than the mean score for all other ethnic groups.

Experiences with Group Facilities Factor

Table 19 (over) presents the results of regressing Experiences with Group Facilities on age, sex, class level, ethnicity, and field of study. Of these categorical variables, only sex and ethnicity do not vary significantly.

Differences among class levels suggest that use of group facilities, including the student union and participation in clubs and organizations, increases with class level. The substantial differences among fields of study do not lend themselves to easy explanation.

Several subpopulations stand out in these analyses as differing in substantial ways from other students. The Quality of Effort reported by Freshmen is substantially below that of other classes on two important factors, Academic Experiences and Experiences with Group Facilities. Several characteristics of the freshman year may contribute to these lower scores.

Each freshman class contains a higher proportion of students who will not persist to graduation than any other class; some of these non-persistors transfer from UC Davis to other postsecondary institutions and others depart without a degree for academic or personal reasons. Theory tells us that students who depart will come disproportionately from those scoring on the bottom end of these scales. In addition, the lives of freshmen, more than those of more advanced students, are likely to be occupied by activities sponsored by the residence halls, activities imperfectly measured by the College Student Experiences Questionnaire.

TABLE 19

QUALITY OF EFFORT: EXPERIENCES WITH GROUP FACILITIES

REGRESSION COEFFICIENTS

Intercept	*55.167*	*ETHNICITY*	*(p = 0.169)*
AGE	*(p = 0.000)*	Whites	0.161
Less than 23	6.393	Blacks	0.986
23-27	-3.067	Chicanos	1.554
More than 27	0.000	Asians	-3.239
SEX	*(p = 0.051)*	Others	0.000
Male	1.244	*FIELD OF STUDY*	*(p = 0.017)*
Female	0.000	Agriculture	5.210
CLASS LEVEL	*(p = 0.005)*	Arts/Humanities	-0.973
Freshmen	-2.467	Physical Sciences	0.855
Sophomores	-0.891	Social Sciences	-0.226
Juniors	-0.205	Engineering/Computer Sci	-4.042
Seniors	0.000	Others	0.000
N:	566	**MULTIPLE R:**	.318
RANGE:	30-120	**SQUARED MULTIPLE R:**	.101

Blacks report higher scores on both the Academic and Interpersonal Experiences scales. This suggests that, insofar as the dimensions represent real effort, Black students are investing substantially in their educations, an investment that is not paying off in high graduation rates.

Students majoring in engineering and computer science report the lowest scores on three of the four factors; they report the highest scores on the Experiences with Science and Computing. The lower scores in Academic Experiences imply that the nature of the academic dimension differs for students in these fields, not that they put less effort into their education.

ESTIMATES OF GAIN

While it may seem self-evident that students expect to get something out of their experience in college, methods to measure that something are less self-evident. Grades do not work very well as they estimate relative achievement at the ends of courses rather than assessing gain over the term of the courses. Although a better student may earn a higher grade in a particular course than a poorer student, he or she may have gained less because of having started at a higher level in the first place. Of course, this problem plagues conventional, traditional measures of assessment and causes some institutions to use standardized tests to assess the intellectual growth of their students. Another approach is the one taken in the College Student Experience Questionnaire: ask students to report their own growth.

The questionnaire asks respondents to estimate their gains, using a four-point scale that goes from "Very much" to "Very little," in twenty-one different areas, ranging from gains in intellectual areas to gains in vocational preparation to gains in personal development. This section of the instrument is headed by these directions: "In thinking over your experiences in college up to now, to what extent do you feel you have gained or made progress in each of the following respects?" This instruction has several implications. The gain alluded to is a gain for the entire college career, not just at UC Davis. Because 25% of our respondents think of themselves as transfer students and 35% had more than 12.5 college units (including advanced placement) at entrance, the gains analyzed below are not, strictly speaking, gains at UC Davis. Most of the gains reported, however, are associated with time on this campus and we shall proceed as if that were the case.

A more important consideration is the fact that the amount of gain possible is, to some extent, limited by the level of achievement when starting college. Students who develop their social skills while still in high school, for example, have less need for such development later. Similarly, some students have advanced skills using computers by the time they graduate from high school; others develop these skills for the first time in college. The former students are likely to report less gain in this area than the latter. This consideration will resurface later in this discussion in connection with particular gains.

UC Davis and the National Norms

Table 20 (over) presents the mean gain reported by UC Davis students and, for comparison, the national norms for 25 doctoral granting institutions (Pace, 1987). Differences in means of less than .2 may be regarded as insignificant. Larger differences may warrant further inspection although not too much should be made of a difference of .2. The scale used to report these gains ranges from 1, very little gain, to 4, very much gain.

TABLE 20
REPORTED GAINS

Gain in:	UC Davis Mean	sd	National Mean
Vocational training	2.2	0.9	2.4
Acquiring background and specialization	2.7	0.8	2.7
Gaining a broad general education	2.8	0.8	2.8
Gaining career information	2.7	0.8	2.8
Understanding art, music and drama	2.0	0.9	2.0
Acquaintance and enjoyment of literature	2.2	0.9	2.1
Writing clearly and effectively	2.6	0.9	2.6
Using computers	2.3	1.0	2.1
Awareness of different philosophies	2.7	0.9	2.5
Developing values and ethical standards	2.9	0.9	2.8
Self-understanding	3.0	0.9	3.0
Understanding others	3.0	0.8	3.0
Ability to function as a team member	2.6	0.9	2.6
Developing good health habits	2.4	1.0	2.3
Understanding the nature of science	2.5	1.0	2.2
Understanding developments in science	2.3	1.0	2.1
Understanding the consequences of new applications in science and technology	2.4	0.9	2.2
Ability to think analytically and logically	2.9	0.8	2.8
Quantitative thinking	2.5	0.9	2.5
Ability to synthesize ideas	2.9	0.8	2.9
Ability to learn on your own	3.0	0.8	3.1

The table holds few surprises. Davis students report gains equal to or exceeding the gains reported in the national norms in all but three cases. Two of the three areas in which Davis students report lower gains correspond to the broadly promulgated image of the campus as emphasizing research and preparation of undergraduates for graduate and professional school: Vocational training—acquiring knowledge and skills applicable to a specific job or type of work (difference = .2); and Gaining a range of information that may be relevant to a career (difference = .1).

The third area for which Davis students report lower gains is: Ability to learn on your own, pursue ideas, and find information you need. The difference, however, is less than .2 and need not be of great concern.

Davis students report gains larger than those in the national norms in nine areas, and in five of these the difference is .2 or greater:

Acquiring familiarity with the use of computers (.2)

Becoming aware of different philosophies, cultures, and ways of life (.2)

Understanding the nature of science and experimentation (.3)

Understanding new scientific and technical developments (.2)

Understanding the consequences of new applications in science and technology (.2)

With one exception—Awareness of different philosophies—the larger gains reported by Davis students correspond to Davis's sense of itself as a science campus.

Estimates of Gain: Factor Analysis

An analysis of twenty-one separate areas of gain would be cumbersome and the results would likely be more complex than necessary. One way of simplifying the analysis is to group related gains together and examine the groups. Factor analysis produces such groups, each of which represents some underlying generalized gain not measured directly. In factor analysis elements are assigned to the factors with which they are highly correlated. The amount of correlation is called the factor loading. Pace (1987) uses this technique on 1983 data from 2 doctoral universities, 1 comprehensive college, and 5 liberal arts colleges (n = 2,299) to factor the twenty-one gains asked about in the CSEQ into five areas or factors:

1. Personal and Social Development
   a. Understanding other people and the ability to get along with different kinds of people.
   b. Understanding yourself—your abilities, interests, and personality.
   c. Developing your own values and ethical standards.
   d. Ability to function as a team member.
   e. Developing good health habits and physical fitness.
2. General Education, Literature and Arts
   a. Broadening your acquaintance and enjoyment of literature.
   b. Writing clearly and effectively.
   c. Developing an understanding and enjoyment of art, music, and drama.
   d. Becoming aware of different philosophies, cultures, and ways of life.
   e. Gaining a broad general education about different fields of knowledge.
3. Intellectual skills
   a. Ability to think analytically and logically.
   b. Ability to put ideas together, to see relationships, similarities, and differences between ideas.
   c. Ability to learn on your own, pursue ideas, and find information you need.
4. Understanding Science/Technology
   a. Understanding new scientific and technical developments.
   b. Understanding the nature of science and experimentation.
   c. Becoming aware of the consequences (benefits/hazards/dangers/values) of new applications in science and technology.
5. Vocation
   a. Vocational training—acquiring knowledge and skills applicable to a specific job or type of work.
   b. Gaining a range of information that may be relevant to a career.
   c. Acquiring background and specialization for further education in some professional, scientific, or scholarly field.

One component in Pace's data—Acquiring familiarity with the use of computers—did not load highly on any of the five factors. Pace assigned it, reasonably enough, to the fourth factor on the grounds that it best fit in with developing technology.

We could use these factors to analyze the UC Davis data without replicating Pace's factor analysis on the grounds that his data are national and his results likely to

represent students in general. The Davis sample is smaller and more subject to sampling variation; differences from the national norms do not necessarily mean that the populations differ in the same way. Nevertheless, Pace's factors make a great deal of intuitive sense and ought to apply to Davis students as well. Accordingly, it seems worthwhile to repeat his factor analysis with the Davis data. Table 21 presents the results of this analysis.

TABLE 21
FACTOR LOADINGS ON GAINS REPORTED BY UC DAVIS STUDENTS AND BY PACE

Factors	UCD	Pace
I. Personal/Social Development		
Understanding others	.80	.77
Team player	.77	.54
Developing values	.67	.69
Self-understanding	.66	.82
Health habits	.64	.50
II. Science and Technology		
Science developments	.90	.95
Science principles	.86	.82
Science consequences	.79	.74
III. General Education Literature and the Arts		
Literature	.82	.88
Art, music & drama	.70	.63
General education	.65	.38
Philosophies	.62	.37
Writing	.55	.45
IV. Intellectual Skills		
Synthetic thinking	.73	.69
Analytical thinking	.72	.76
Independent learning	.70	.40
Quantitative thinking	.51	.61
Using computers	.42	.20
V. Vocational Preparation		
Vocational training	.78	.74
Career information	.71	.64
Specialization	.65	.46

The components loading on each of the five factors (i.e., are highly correlated with them) are those we would expect based on Pace's analysis. There are some differences in the order in which the components load and some differences in the factor loadings themselves. Nevertheless, the essential similarity indicates the fundamental stability of the five factors.

This factor analysis finds a place for the one lonely component in the intellectual skills factor—Acquiring familiarity with the use of computers. In the period since Pace's work, computers have become ubiquitous; their use as a tool of the mind guarantees their impact will not be limited to students interested in science and technology.

The stability of the factors suggests that they really do measure some underlying dimensions of what students get out of college. We may use them to compare gains reported by different groups. This part of the analysis will examine the population by sex, class, age, grades, time spent on school work, perceptions of racial harmony and

major field. Although we include an analysis of differences by ethnicity using the factors derived above, it is important to note that overall stability of the factors does not apply to the individual ethnic groups. Indeed, the differences in factors among the ethnic groups suggest that the outcomes of the college experience at Davis vary by ethnicity.

The bivariate analyses presented in Tables 22-28 and in the discussion associated with them are suggestive only. In each case, the differences in mean scores are presented without controlling for other variables. What appears to be a significant relationship may prove to be less significant in a multivariate setting. Even so, the bivariate relationships will guide us later in our analysis and deserve attention here.

SEX

Men and women may report different gains for a number of reasons. In addition to possible systematic differences in achievement or preparation at entrance, institutional characteristics (sexism for example) might cause men and women to perceive different gains. Table 22 summarizes the results for men and women.

TABLE 22
RELATIVE GAINS REPORTED BY UC DAVIS STUDENTS IN PERSONAL DEVELOPMENT, SCIENCE AND TECHNOLOGY, GENERAL EDUCATION, AND INTELLECTUAL AND VOCATIONAL DEVELOPMENT
—by sex—
—in mean scores—

	Factor I Personal Development	II Science & Technology	III General Education	IV Intellectual Development	V Vocational Development
National Norm	2.73	2.17	2.36	2.67	2.67
UC Davis—Sex					
Male	2.71	2.63	2.33	2.83	2.65
Female	2.79	2.27	2.50	2.65	2.53
T-statistic	*1.659*	*5.384**	*3.410**	*2.750**	*1.928*

*p < .05.

Men and women differ significantly in reported gains in three factors. Men report higher gains in Factor II (Science and Technology) and Factor IV (Intellectual Development). They report lower gains for Factor III (General Education, Literature and the Arts). The differences revealed in Table 1.3 argue for including sex in the multivariate analysis later.

CLASS LEVEL AND AGE

If reported gains are associated with college experience, one would expect that they would vary by class level. Table 23 summarizes the results for four class levels.

TABLE 23
RELATIVE GAINS REPORTED BY UC DAVIS STUDENTS IN PERSONAL DEVELOPMENT, SCIENCE AND TECHNOLOGY, GENERAL EDUCATION, AND INTELLECTUAL AND VOCATIONAL DEVELOPMENT
—by class level—
—in mean scores—

	Factor I Personal Development	II Science & Technology	III General Education	IV Intellectual Development	V Vocational Development
National Norm	2.73	2.17	2.36	2.67	2.67
UC DAVIS—CLASS LEVEL					
Freshman	2.62	2.16	2.34	2.49	2.39
Sophomore	2.84	2.38	2.53	2.76	2.50
Junior	2.69	2.55	2.40	2.76	2.63
Senior	2.83	2.50	2.46	2.82	2.73
F-statistic	*3.482**	*8.917**	*2.548*	*8.362**	*8.274**

**p < .05.*

The gains reported by class level reveal some interesting patterns. Although gains generally increase with class level, the pattern is clearest for Factors IV (Intellectual Development) and V (Vocational Development). In these cases, students appear to continue to gain throughout their academic careers. This is not the case for Factor III (General Education, Literature and the Arts); here the gains are relatively homogeneous across levels. This finding suggests that, at UC Davis, gains in this area are achieved early in a student's career and that, once achieved, the student does not continue to build on them.

The pattern for reported gain in Factor I (Personal Development) suggests a similar finding. To some extent, the largest gain in this area might take place in the first months after arriving on campus. This is likely to be each student's first extended experience away from home, a time in which values and attitudes are most likely to be changed or expanded. Indeed, as Table 24 (over) shows, mean gain in personal development declines as age group increases. The drop-off for Juniors may reflect the influence of Junior transfers. If so, it lends credence to the notion that Davis better supports personal growth than the institutions from which transfer students come.

Another influence on estimated gain could very well be the age of the respondent. Although more advanced students are, as a group, older than their less advanced peers, class level does not replace age as an explanatory variable. After all, class level ignores the fact that some students do not start college right after high school and others have hiatuses in their academic careers. CSEQ discriminates among three age groups and Table 24 summarizes the results for these.

TABLE 24
RELATIVE GAINS REPORTED BY UC DAVIS STUDENTS IN PERSONAL DEVELOPMENT, SCIENCE AND TECHNOLOGY, GENERAL EDUCATION, AND INTELLECTUAL AND VOCATIONAL DEVELOPMENT
—by age group—
—in mean scores—

	Factor I Personal Development	II Science & Technology	III General Education	IV Intellectual Development	V Vocational Development
National Norm	2.73	2.17	2.36	2.67	2.67
UC Davis—Age Group					
22 or younger	2.80	2.41	2.46	2.73	2.57
23-27	2.59	2.51	2.36	2.75	2.64
28 or older	2.45	2.22	2.30	2.52	2.49
F-statistic	*6.314**	*2.678**	*0.933*	*2.232*	*1.549*

*$p < .05$.

Analysis of variance, the F-statistics, suggests that at least one of the means differs from the others for Factors I (Personal Development) and II (Science and Technology). For each of these, the older the group of students the lower the gains reported. It is likely that the oldest group of students enter the institution with the largest base in each of these factors and that gain follows the law of diminishing returns.

The factor with the largest differences is Personal Development. The gains reported in Personal Development by younger students are substantially and statistically higher than those reported by older students. This is, of course, exactly the pattern one would expect if such growth occurs normally with maturation during the late teens and is, at least partially, independent of the educational institution attended.

GRADES

The analysis of reported gains by self-reported grades is presented in Table 25.

TABLE 25
RELATIVE GAINS REPORTED BY UC DAVIS STUDENTS IN PERSONAL DEVELOPMENT, SCIENCE AND TECHNOLOGY, GENERAL EDUCATION, AND INTELLECTUAL AND VOCATIONAL DEVELOPMENT
—by academic achievement—
—in mean scores—

	Factor I Personal Development	II Science & Technology	III General Education	IV Intellectual Development	V Vocational Development
National Norm	2.73	2.17	2.36	2.67	2.67
UC Davis—Grade Groups					
A	2.62	2.47	2.42	2.62	2.55
A-, B+	2.71	2.50	2.45	2.79	2.62
B	2.82	2.43	2.47	2.82	2.65
B-, C+	2.82	2.40	2.45	2.65	2.52
C, C- or lower	2.58	2.16	2.25	2.54	2.38
F-statistic	*1.258*	*1.906*	*0.887*	*2.600**	*1.346*

**p < .05.*

Only Factor IV (Intellectual Development) stands out in this table and the pattern for this factor is curvilinear, with the students in the middle of the scale reporting the largest gains. Gains in intellectual development are subject to both what happens at the institution and the intellectual base with which the student enters. This being the case, the relative gain will be, as it is here, lower at the extremes.

TIME SPENT ON SCHOOL WORK

One might expect that those students who spend the most time on their school work would garner the most gains. Table 26 (over) summarizes reported gain by reported time spent on school work.

The largest differences in reported gains occur for Factor II (Science and Technology). For this factor, increases in the number of hours worked are clearly associated with increases in reported gains. Pairwise comparisons reveal that the

gains reported for the lowest three groups do not differ significantly from each other but they do differ from the highest two groups, which also differ significantly from each other. This finding suggests that the largest increase in gains can be expected for students who spend about 40 hours per week or more on school work.

TABLE 26

RELATIVE GAINS REPORTED BY UC DAVIS STUDENTS IN PERSONAL DEVELOPMENT, SCIENCE AND TECHNOLOGY, GENERAL EDUCATION, AND INTELLECTUAL AND VOCATIONAL DEVELOPMENT

—by time spent on school work—

—in mean scores—

	Factor I Personal Development	II Science & Technology	III General Education	IV Intellectual Development	V Vocational Development
National Norm	2.73	2.17	2.36	2.67	2.67
UC Davis—Time Spent on School Work					
Less than 20 hrs/week	2.56	2.21	2.37	2.58	2.49
About 20 hrs/week	2.75	2.24	2.48	2.62	2.48
About 30 hrs/week	2.77	2.26	2.46	2.66	2.52
About 40 hrs/week	2.82	2.56	2.42	2.83	2.63
50 hrs/week or more	2.64	2.79	2.38	2.83	2.76
F-statistic	*0.718*	*11.841**	*0.783*	*5.317**	*4.290**

**p < .05.*

Although the differences in reported gains are not as large for Factor IV (Intellectual Development) as for Factor II, the pattern revealed by pairwise comparisons is very similar save for the fact that the upper two groups do not differ significantly from each other. Gains in Intellectual Development jump with an increase of hours per week spent on school work to 40 or more.

RACIAL HARMONY

Past work (Low, 1988) looked at differences in satisfaction with racial harmony at UC Davis. In order to see if those differences continued, a question about racial harmony was added by the campus to the College Student Experiences Questionnaire. Accordingly it is possible to examine reported gains to see if they differ by satisfaction with this aspect of UC Davis. Table 27 (over) summarizes this material.

As it turns out, except for Factor V (Vocational Development), the pattern of differences does not appear to be meaningful. For the last factor, however, there is a clear pattern of gain being positively associated with satisfaction with racial

harmony; as satisfaction decreases, so does reported gain. Those most satisfied or satisfied with racial harmony report gains in vocational skills that are significantly different from those who are neutral or dissatisfied with racial harmony at Davis.

TABLE 27
RELATIVE GAINS REPORTED BY UC DAVIS STUDENTS IN PERSONAL DEVELOPMENT, SCIENCE AND TECHNOLOGY, GENERAL EDUCATION, AND INTELLECTUAL AND VOCATIONAL DEVELOPMENT
—by perceptions of racial harmony—
—in mean scores—

	Factor I Personal Development	II Science & Technology	III General Education	IV Intellectual Development	V Vocational Development
UC Davis—Level of Satisfaction					
Very satisfied	2.87	2.39	2.43	2.92	2.66
Satisfied	2.78	2.58	2.47	2.76	2.73
Neutral	2.67	2.30	2.38	2.65	2.49
Dissatisfied	2.82	2.33	2.49	2.76	2.49
Very dissatisfied	2.71	2.35	2.52	2.54	2.42
F-statistic	*1.316*	*2.267*	*1.189*	*1.730*	*4.031**

**p < .05.*

ACADEMIC DISCIPLINE

Table 28 (over) presents the results of analyzing reported gains by academic discipline.

For Factor I (Personal Development) the reported gains are relatively homogeneous, while for Factor II (Science and Technology) the reported gains are anything but homogeneous. Pairwise comparisons reveal that students in agriculture do not differ significantly from those in "other disciplines"; neither do students in the physical sciences differ from those in engineering. All other pairs are significantly different. The direction of these differences is not surprising: those in the sciences and engineering report the largest gains and those in the arts, humanities and social sciences, the smallest.

The pattern for Factor III (General Education, Literature and the Arts) is a mirror image of that for Factor II. Here students in arts, humanities and social sciences report the largest gains while smaller gains are reported by those in the sciences and engineering.

TABLE 28
RELATIVE GAINS REPORTED BY UC DAVIS STUDENTS IN PERSONAL DEVELOPMENT, SCIENCE AND TECHNOLOGY, GENERAL EDUCATION, AND INTELLECTUAL AND VOCATIONAL DEVELOPMENT

—by academic discipline—
—in mean scores—

	Factor I Personal Development	II Science & Technology	III General Education	IV Intellectual Development	V Vocational Development
National Norm	2.73	2.17	2.36	2.67	2.67
UC Davis—Academic Disciplines					
Agricultural	3.00	2.27	2.46	2.88	2.61
Arts and Humanities	2.65	1.83	2.85	2.48	2.36
Physical Sciences	2.82	2.92	2.32	2.74	2.65
Social Sciences	2.78	1.99	2.52	2.68	2.46
Engineering	2.52	2.83	2.02	2.96	2.74
Other	2.77	2.17	2.57	2.60	2.58
F-statistic	1.914	45.265*	21.393*	5.398*	4.874*

*p < .05.

EFFECTS OF QUALITY OF EFFORT ON ESTIMATES OF GAIN

The analysis of estimates of gain thus far has not included the effects of Quality of Effort. But Pace argues that the college experience depends, at least in part, on the effort expended by the individual student. Accordingly, the Quality of Effort put out by students should, as it were, be put into the equation.

The next part of this analysis examines effect of the Quality of Effort measured on the four composite scales (Academic Experiences, Science and Computer Experiences, Interpersonal Experiences, Experiences with Group Facilities) on the five estimates of gain, using multiple regression (see Appendix, Tables B-4 through B-8). The regressions enable us to examine whether the extent to which differences (or variance) in reported gains are associated with either sex, with particular ethnicities, and so forth. By performing the regressions in hierarchical fashion in four steps, we can sort out direct and indirect effects.

The hierarchy of the four steps represents a kind of causal order. Students have no control over their sex, ethnicity, or age, so these were put in the first equation (Reduced Model 1 or Equation 1). These characteristics, however, could have an impact on major selection and class level. Women, for example, are less likely to major in engineering than men. Accordingly, major field and class level were added into the second equation. The final two models are built under the assumption that time spent on academic matters and on employment are affected by major field and class level but that these major field and class level are causally prior to the Quality of Effort measured by those scales. That is, the time spent on academics and away from academics working has an impact on the Quality of Effort put out by the student. This final model may be referred to as the full model or the structural equation.

Interpretation of these models is tricky. The regression coefficients represent the change in gain, measured in standard deviations, associated with a one unit change in each of the independent variables. But what does a one unit difference in the Quality of Effort—Group Facilities--for example, mean in the real world? And what does it mean to be so many standard deviations higher or lower on one or another of the gain scales?

The answers to these questions are not entirely clear. While we may be sure that the Quality of Effort scales measure something real, it is less clear just how the scales apply to the real underlying factor. The same sort of qualification applies to the estimate of gain scales. Nevertheless, we may proceed with the assumption that students scoring higher on the gain scales got more out of their university experience than those scoring lower on the same scale and that those scoring higher on a particular Quality of Effort scale put more into their experience than those lower on the scale.

FACTOR I: GAIN IN PERSONAL DEVELOPMENT

Regressing gain in Personal Development on sex, ethnicity, age, academic field, class level, time spent working on classwork, amount of time employed, and the four Quality of Effort factors (see Table B-4) produces few surprises other than the relatively small amount of variation explained by the full model (18.8%). This variation is substantially smaller than the results Pace (1983) found, 46%. Pace's model, however, was developed using stepwise regression, which has some theoretical drawbacks, and it includes two environment scales. While this approach may be appropriate for a multi-institutional study, it is less so for a single-institution study. After all, in a single-institution study the environment is a constant even if its perception is not. The relatively small variance explained here may have several causes. Gains in Personal Development may be driven by a much wider set of variables, no one of which is particularly strong. Or the CSEQ may not touch on the primary factor.

Reduced Model 1 explains a small but statistically significant amount of variance (3.7%) in reported gains in Personal Development. Of the three demographic characteristics in Equation 1, only age is statistically significant. The older the respondent, the less gain in Personal Development he or she reports. Respondents in the middle age group (23-27) report .367 less gain in Personal Development, and the oldest group of respondents report .556 less gain than respondents who are 22 or younger, all other things being equal.

While this pattern of larger gains for younger students holds for all four of the models for Personal Development, the size of the effect is smallest in the Structural Equation. This makes intuitive sense: older students are likely to have larger bases of experience at entrance, to be more fully formed as it were, than younger students. Accordingly, the range of possible gain in Personal Development would be smaller for older students. At the same time, such students are more likely to have extracurricular distractions—spouses, children and the like—that would reduce the frequency of activities making up the Quality of Effort scales associated with increased gain in Personal Development.

Although the regression coefficients for Male in each of the models show that men report less gain in Personal Development than women, we are unable to say with much confidence that the differences between the two sexes are statistically significant: there is slightly more than one chance in five that the differences among men and women respondents would not be found in the whole undergraduate population. Differences among the ethnic groups are even smaller.

Neither class level nor field of study has by itself a statistically significant relationship with the variance in reported gain in Personal Development. Nevertheless, adding both to the demographic variables of Reduced Model 1 increases significantly the variance in reported gain explained. The same cannot be said for the addition of time spent on academics and work.

The biggest jump in the amount of variance explained by the models occurs when the Quality of Effort scales are added. The Quality of Effort scales that one would expect to be associated with gains in Personal Development—activities involving interpersonal relations and group facilities—are in fact positively related. Students reporting greater Quality of Effort in these areas report greater gains in Personal Development. In this area of gain, at least, Pace's theory applies to UC Davis students: the more effort that each puts into informal interpersonal activities and the use of group facilities, the greater the gain in Personal Development.

These are all but details of a relatively clear picture of the gains in Personal Development among these respondents. Underlying this factor is a psycho-social dimension along which there is natural and normal growth in early adulthood—maturation that is at least partly independent of the environment in which the individual finds him- or herself. While the institution may contribute to this development, it will take place willy-nilly. Furthermore, gains are related more to non-academic activities than to academic activities.

FACTOR II: SCIENCE AND TECHNOLOGY

Regressing gain in Science and Technology on sex, ethnicity, age, academic field, class level, time spent working on classwork, amount of time employed, and the four Quality of Effort factors (see Table B-5) reveals a wealth of interesting relationships.

An examination of the total effects of sex, ethnicity, and age on reported gains in Science and Technology without controlling for other possibly important variables (Reduced Model 1) suggests differences by both sex and ethnicity. Men report significantly greater gains than women on this measure. The total effect (.440—revealed in Equation 1) is more than twice the direct effect (.188—found in the Structural Equation). This means that a substantial portion of the men's larger reported gain may be explained by choice of major—men are more likely to major in the physical sciences and engineering than women—and by differences in the Quality of Effort put into science activities—men report higher Quality of Effort than women. However, even when differences in major and Quality of Effort are accounted for, men still report greater gain in Science and Technology than women. This suggests that men not majoring in the sciences are more likely to broaden their scientific education than women—or perhaps men not ending up in the sciences are more likely to have begun there than their female peers.

Asians report the largest gains in Reduced Model 1; Blacks, the least. But once class level and major field are added, the large difference between Asians and Whites (the comparison group) disappears and the Asian estimate of gain drops slightly below that of Whites, although the difference is not statistically significant. This says that most of the difference between Whites and Asians is associated with choice of major.

Differences between the gains reported by Blacks and Whites are statistically significant only in Reduced Model 2; in the Structural Equation, when differences in

Quality of Effort are accounted for, the difference between Blacks and Whites drops off substantially.

Not surprisingly, students in the sciences (the reference group for academic fields) report the greatest gains in this factor. Furthermore, even when Quality of Effort is controlled for, as in the full model, large differences remain as direct effects. Perhaps the most surprising of these differences occurs in the case of students in agriculture, who are almost one complete standard deviation below students in the sciences on this factor. Even when time spent and Quality of Effort are controlled for, the direct effect is -.431 standard deviations.

Adding time spent on academic matters and time spent working significantly increases the amount of variance in reported gain in Science and Technology. In particular, the more time spent on academics, the more gain reported. About one-third of this effect is indirect through Quality of Effort, but we may be confident that a similar relationship between time spent on academics and gain in Science and Technology holds among all undergraduates.

FACTOR III: GENERAL EDUCATION, LITERATURE AND THE ARTS

Regressing reported gain in General Education, Literature and the Arts on sex, ethnicity, age, academic field, class level, time spent on academics and working, and four Quality of Effort scales produces few surprises (see Appendix, Table B-6). When only sex, ethnicity and age are controlled for, men report significantly less total gain in this area than women and Asians report less than Whites. The size of these differences becomes smaller and their statistical significance vanishes when major field and class level are added to the model. This suggests that the differences are the product of differences in choice of major; women are more likely than men to choose majors outside the physical sciences and engineering.

The effect of major field is pretty much what one would anticipate. Students in the arts and humanities report substantially more gain on this factor than students in the physical sciences (1.081 standard deviations). Most of this difference is a direct effect (0.764); it remains even after time spent and Quality of Effort are controlled for. More surprising, perhaps, is the fact that students in engineering and computer science report significantly less gain than students in the physical sciences (total effect = -.467; direct effect = -.400). This phenomenon may be of the sort that lies behind the old stereotype of engineering students as narrow in their interests and training. More charitably and probably more accurately, it may be said that this results from the very intensive and directed programs in engineering.

The Quality of Effort scales themselves reveal some interesting patterns; effort in Science and Technology is negatively related to gain in General Education; the more effort reported, the less gain. Effort spent in other academic activities is, not surprisingly, positively related to gain on this factor: the higher the Quality of Effort, the greater the gain.

FACTOR IV: INTELLECTUAL DEVELOPMENT

Regressing Factor IV (Intellectual Development) on sex, ethnicity, age, academic field, class level, time spent, and Quality of Effort produces a model of underwhelming explanatory power (see Appendix, Table B-7). Where Pace's model explains 46% of the variation in the 1983 data (Pace, 1984), this model only accounts for 14.8%. As with the models for Factor I (Personal Development), the greater heterogeneity of Pace's respondents works to his advantage.

The results of this regression reveal several significant differences among the gains reported by students in different fields. Students in the social sciences and in engineering and computer science report significantly higher gains than students in the physical sciences. Furthermore, the size of the differences increases when Quality of Effort is added to the model. Because the skills that make up this factor are expected of scientists and engineers, this result may be surprising. But the gain reported is gain achieved while at UC Davis; we may therefore suppose that the differences among the majors reflects different levels of ability at entrance. In this view, students majoring in the physical sciences enter the institution with these skills more fully developed and thus have less room for improvement than, say, students in the humanities.

FACTOR V: VOCATIONAL DEVELOPMENT

Regressing Factor V (Vocational Development) on sex, ethnicity, age, academic field, class level, time spent, and Quality of Effort produces interesting but not surprising results (see Appendix, Table B-8). Sex, ethnicity and gender do not explain a statistically significant amount of the variance in estimated gains in Vocational Development. Furthermore, as we read the regression coefficients for these variables in each of the models, we see none of them become significant as we control for increasing numbers of characteristics. This suggests that estimates of gain in this area do not vary with sex, ethnicity, or age.

Adding class level and major field, however, pumps up the variance explained to a significant level. The big jump in this comes from the addition of class level to the equation. Simply put, more advanced students report larger gains regardless of sex, ethnicity, or major field. Differences in major field also explain some of the differences. Students in engineering report the largest gains and students in arts and humanities, the smallest.

Although neither of the coefficients of time spent on academics or time spent working is significant, the inclusion of these two variables, Equation 3, increases significantly the amount of variation explained. In both cases increases in the time spent are associated with increased reported gain.

APPENDIX A
METHODOLOGY AND QUESTIONNAIRE

SAMPLING SCHEME

The campus's Student Information Systems provided a roster of ID numbers and local zip codes for all undergraduates enrolled Spring 1989. From this list we excluded all those students with local ZIP codes sufficiently distant from the campus to indicate a probable problem with their local addresses. We then divided the remainder into three strata: Blacks, Chicanos, and all other ethnicities. From these three strata we selected systematic random samples of 300 Blacks, 300 Chicanos, and 886 of all other ethnicities for a total sample of 1486.

Two factors influenced the size of the samples. The project director of the College Experiences Study, George Kuh, originally requested a sample of 1000 with double sampling of Blacks and Chicanos. This scheme would have resulted in samples of Chicanos and Blacks too small to permit comparisons among ethnic groups. Accordingly, we sampled 300 Blacks and 300 Chicanos because past experience suggested 33% response rates for these groups and we wanted minimum response groups of 100.

On April 21, we mailed packets to the local addresses of our sample population. On May 4, we sent a follow up postcard to the entire sample thanking those who had already responded and asking the rest to be sure to return their questionnaires. On May 19, we sent a second packet to those in the sample who had not returned their questionnaires from the earlier mailing. For all mailings we used a combination of bulk mail (for off-campus addresses) and on-campus mail for the material going out and postage-paid envelopes for the returned material. The material mailed makes up the last part of this Appendix.

We accepted completed questionnaires through 23 June, when we had received 725 responses (112 Blacks, 145 Chicanos, and 468 other respondents) for a total response rate of almost 49%.

This response rate is somewhat lower than we generally get with the kind of procedures we used with this survey. It is true that our students have been the recipients of numerous surveys of late and were, perhaps, less willing as a result to fill out a long instrument. Nevertheless, we have not encountered such hostility to an instrument in the past. One student returned the questionnaire with "F___ YOU" scrawled on it as the sole response (we did not count it as a response). While this was more abusive than most of the complaining comments, it implied an intensity found in others. I suspect, then, that resistance to responding was at least partially driven by reaction to the instrument itself. The lower-than-average response rate and the hostility found in the comments suggest that the results of the survey should be treated with some caution.

RESPONSE BIAS

Because the possibility of non-response bias increases as response rates go down, it is worthwhile to examine the response rates of different subgroups so as to anticipate systematic differences among them. Table A-1 presents the response rates for various ethnic subgroups distributed by sex.

TABLE A-1
RESPONSE RATES

	Male	Female	All
All*	40.9	55.3	48.7
Black*	29.8	42.9	37.5
Asian	51.6	59.8	55.7
Chicano*	41.7	57.7	49.7
White*	42.6	59.6	52.3

**Chi-square significant at alpha = .05.*

These results show that women were more likely than men to return a completed questionnaire and that, insofar as men and women differ in the quality of their college experiences, the overall results are likely to show a female bias. Furthermore, the differential response rates pertain to each ethnic group, being most exaggerated in the case of Blacks and least for Asians.

Differences in the response rates for each ethnic group and the differences between the two sexes raise the specter of non-response bias. Table A-2 examines the UC Davis GPAs of respondents and non-respondents.

TABLE A-2
UC DAVIS GPAS OF SURVEY RESPONDENTS AND NON-RESPONDENTS

	All	Black	Asian	Chicano	White	Female	Male
(UC Davis)	(2.797)	(2.354)	(2.774)	(2.531)	(2.879)	(2.838)	(2.752)
Non-Respondents	2.584	2.326	2.709	2.404	2.794	2.649	2.525
Respondents	2.767	2.443	2.868	2.606	2.851	2.783	2.741
F-ratio	39.55*	3.47*	3.89	3.65	13.56*	11.91*	23.50*

**Significant at alpha = .05*

These results raise an additional concern. Those in the sample doing less well at Davis, as measured by GPA, were less likely to return a completed questionnaire. Furthermore, GPAs of the original sample are slightly lower than those of the whole population. On this measure, then, the respondent population is closer to the whole population than the sample.

COLLEGE STUDENT EXPERIENCES

The main purpose of this inquiry is to learn more about how students spend their time – in course work, in the library, in contacts with faculty, in extracurricular activities, in various social and cultural activities, and in using other facilities and opportunities that exist in the college setting.

The information obtained from you and from other students at many different colleges and universities will provide new insight to administrators, faculty members, and others who provide the resources and shape the programs that are meant to be of benefit for student learning and development within the college experience.

At first glance you may think it will take a long time to fill out this questionnaire, but you will find that it can be answered quite easily, that you can do it in less than an hour and perhaps only 30 to 45 minutes. You will find, too, when you have finished it, that your answers provide a kind of self-portrait of what you have been giving and getting in your college experience.

The ultimate benefits in this or any other survey depend on the thoughtful responses and willing participation from those who are asked to help. Your willingness to participate is important and very much appreciated.

We do not ask you to write your name anywhere in this questionnaire; but we do need to know where the reports come from, and that is why each questionnaire has a number on the back page—certain blocks of numbers tell us that those questionnaires have come from your college.

And, as you will see on the next page, we need to know a few things about you and where you come from, so that we can learn how activities might be related to age, sex, year in college, major field, whether one lives on the campus, whether one has a job, etc.

The questionnaire responses will be read by an electronic scanning device. The machine can only read messages given to it with a soft, **black lead pencil**. Please be careful in marking your responses. Erase cleanly any response you wish to change.

CSE

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This questionnaire is available through the Center for the Study of Evaluation, UCLA Graduate School of Education, 405 Hilgard Ave., Los Angeles, CA 90024. It is intended for use by any college or university that wishes to have an inventory of the campus experiences of its students.

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BACKGROUND INFORMATION

DIRECTIONS: Indicate your response by filling in the appropriate space under each question.

Age

- ○ 22 or younger
- ○ 23–27
- ○ 28 or older

Sex

- ○ male
- ○ female

Are you single or married?

- ○ single
- ○ married

What is your classification in college?

- ○ freshman
- ○ sophomore
- ○ junior
- ○ senior
- ○ graduate student

Did you enter college here or did you transfer here from another college?

- ○ entered here
- ○ transferred from another college

Have you at any time while attending this college lived in a college dormitory, fraternity or sorority house, or other college housing?

- ○ yes
- ○ no

Where do you now live during the school year?

- ○ dormitory or other college housing
- ○ fraternity or sorority house
- ○ private apartment or room within walking distance of the college
- ○ house, apartment, etc. away from the campus
- ○ with my parents or relatives

At this college, up to now, what have most of your grades been?

- ○ A
- ○ A–, B+
- ○ B
- ○ B–, C+
- ○ C, C–, or lower

Which of the following comes closest to describing your major field of study (or your expected major)?

- ○ Agriculture
- ○ Arts (art, music, theater, etc.)
- ○ Biological Sciences (biology, biochemistry, botany, zoology, etc.)
- ○ Business
- ○ Computer Science
- ○ Education (including physical education and recreation)
- ○ Engineering
- ○ Health related fields (nursing, physical therapy, health technology, etc.)
- ○ Humanities (literature, languages, history, philosophy, religion, etc.)
- ○ Physical Sciences (physics, chemistry, mathematics, astronomy, earth science, etc.)
- ○ Social Sciences (economics, political science, psychology, sociology, etc.)
- ○ Other: What? →

  [ ]

- ○ Undecided

Did either of your parents graduate from college?

- ○ no
- ○ yes, both parents
- ○ yes, father only
- ○ yes, mother only

When, or if, you graduate from college, do you expect to enroll for a more advanced degree?

- ○ yes
- ○ no

Are you going to school full-time or part-time?

- ○ full-time
- ○ part-time

During the time school is in session, about how many hours a week do you usually spend on activities that are related to your school work? This includes time spent in class and time spent studying.

- ○ about 50 hours a week or more
- ○ about 40 hours a week
- ○ about 30 hours a week
- ○ about 20 hours a week
- ○ less than 20 hours a week

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During the time school is in session, about how many hours a week do you usually spend working on a job?

- ○ none. I am not employed during the school year.
- ○ about 10 hours or less
- ○ about 15 hours
- ○ about 20 hours
- ○ about 30 hours
- ○ more than 30 hours

About how much of your college expenses this year are provided by your parents or family?

- ○ all or nearly all
- ○ more than half
- ○ less than half
- ○ none or very little

What is your racial or ethnic identification?

- ○ White, Caucasian
- ○ Black
- ○ Hispanic, Mexican-American, Puerto Rican
- ○ Oriental or Asian
- ○ Other: What?

How are you classified in the United States?

- ○ Citizen of the United States
- ○ Immigrant (permanent resident)
- ○ Non-immigrant

If you are not a citizen of the United States, in what country are you a citizen?

COLLEGE ACTIVITIES

DIRECTIONS: In your experience at this college during the current school year, about how often have you done each of the following? Indicate your response by filling in one of the spaces to the left of each statement.

Very often	Often	Occasionally	Never	Library Experiences
○	○	○	○	Used the library as a quiet place to read or study materials you brought with you.
○	○	○	○	Used the card catalogue to find what materials there were on some topic.
○	○	○	○	Asked the librarian for help in finding material on some topic.
○	○	○	○	Read something in the reserve book room or reference section.
○	○	○	○	Used indexes (such as the Reader's Guide to Periodical Literature) to journal articles.
○	○	○	○	Developed a bibliography or set of references for use in a term paper or other report.
○	○	○	○	Found some interesting material to read just by browsing in the stacks.
○	○	○	○	Ran down leads, looked for further references that were cited in things you read.
○	○	○	○	Used specialized bibliographies (such as Chemical Abstracts, Psychological Abstracts, etc.).
○	○	○	○	Gone back to read a basic reference or document that other authors had often referred to.

Very often	Often	Occasionally	Never	Experiences with Faculty
○	○	○	○	Talked with a faculty member.
○	○	○	○	Asked your instructor for information related to a course you were taking (grades, make-up work, assignments, etc.).
○	○	○	○	Visited informally and briefly with an instructor after class.
○	○	○	○	Made an appointment to meet with a faculty member in his/her office.
○	○	○	○	Discussed ideas for a term paper or other class project with a faculty member.
○	○	○	○	Discussed your career plans and ambitions with a faculty member.
○	○	○	○	Asked your instructor for comments and criticisms about your work.
○	○	○	○	Had coffee, cokes, or snacks with a faculty member.
○	○	○	○	Worked with a faculty member on a research project.
○	○	○	○	Discussed personal problems or concerns with a faculty member.

DIRECTIONS: In your experience at this college during the current school year, about how often have you done each of the following? Indicate your response by filling in one of the spaces to the left of each statement.

Very Often Often Occasionally Never

Course Learning

- ○○○○ Took detailed notes in class.
- ○○○○ Listened attentively in class meetings.
- ○○○○ Underlined major points in the readings.
- ○○○○ Tried to see how different facts and ideas fit together.
- ○○○○ Thought about practical applications of the material.
- ○○○○ Worked on a paper or project where you had to integrate ideas from various sources.
- ○○○○ Summarized major points and information in your readings or notes.
- ○○○○ Tried to explain the material to another student or friend.
- ○○○○ Made outlines from class notes or readings.
- ○○○○ Did additional readings on topics that were introduced and discussed in class.

Very Often Often Occasionally Never

Art, Music, Theater

- ○○○○ Talked about art (painting, sculpture, architecture, artists, etc.) with other students at the college.
- ○○○○ Gone to an art gallery or art exhibit on the campus.
- ○○○○ Read or discussed the opinions of art critics.
- ○○○○ Participated in some art activity (painting, pottery, weaving, drawing, etc.).
- ○○○○ Talked about music (classical, popular, musicians, etc.) with other students at the college.
- ○○○○ Attended a concert or other music event at the college.
- ○○○○ Read or discussed the opinions of music critics.
- ○○○○ Participated in some music activity (orchestra, chorus, etc.).
- ○○○○ Talked about the theater (plays, musicals, dance, etc.) with other students at the college.
- ○○○○ Seen a play, ballet, or other theater performance at the college.
- ○○○○ Read or discussed the opinions of drama critics.
- ○○○○ Participated in or worked on some theatrical production (acted, danced, worked on scenery, etc.).

Very Often Often Occasionally Never

Student Union

- ○○○○ Had meals, snacks, etc. at the student union or student center.
- ○○○○ Looked at the bulletin board for notices about campus events.
- ○○○○ Met your friends at the student union or student center.
- ○○○○ Sat around in the union or center talking with other students about your classes and other college activities.
- ○○○○ Used the lounge(s) to relax or study by yourself.
- ○○○○ Seen a film or other event at the student union or center.
- ○○○○ Attended a social event in the student union or center.
- ○○○○ Heard a speaker at the student union or center
- ○○○○ Played games that were available in the student union or center (ping-pong, cards, pool, pinball, etc.).
- ○○○○ Used the lounge(s) or meeting rooms to meet with a group of students for a discussion.

Very Often Often Occasionally Never

Athletic and Recreation Facilities

- ○○○○ Set goals for your performance in some skill.
- ○○○○ Followed a regular schedule of exercise, or practice in some sport, on campus.
- ○○○○ Used outdoor recreational spaces for casual and informal individual athletic activities.
- ○○○○ Used outdoor recreational spaces for casual and informal group sports.
- ○○○○ Used facilities in the gym for individual activities (exercise, swimming, etc.).
- ○○○○ Used facilities in the gym for playing sports that require more than one person.
- ○○○○ Sought instruction to improve your performance in some athletic activity.
- ○○○○ Played on an intramural team.
- ○○○○ Kept a chart or record of your progress in some skill or athletic activity.
- ○○○○ Played in any varsity sport or athletic event.

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DIRECTIONS: In your experience at this college during the current school year, about how often have you done each of the following? Indicate your response by filling in one of the spaces to the left of each statement.

Very often / Often / Occasionally / Never

Clubs and Organizations

- ○○○○ Looked in the student newspaper for notices about campus events and student organizations.
- ○○○○ Attended a program or event put on by a student group.
- ○○○○ Read or asked about a club, organization, or student government activity.
- ○○○○ Attended a meeting of a club, organization, or student government group.
- ○○○○ Voted in a student election.
- ○○○○ Discussed policies and issues related to campus activities and student government.
- ○○○○ Worked in some student organization or special project (publications, student government, social event, etc.).
- ○○○○ Discussed reasons for the success or lack of success of student club meetings, activities, or events.
- ○○○○ Worked on a committee.
- ○○○○ Met with a faculty adviser or administrator to discuss the activities of a student organization.

Very often / Often / Occasionally / Never

Experience in Writing

- ○○○○ Used a dictionary or thesaurus to look up the proper meaning of words.
- ○○○○ Consciously and systematically thought about grammar, sentence structure, paragraphs, word choice, and sequence of ideas or points as you were writing.
- ○○○○ Wrote a rough draft of a paper or essay and then revised it yourself before handing it in.
- ○○○○ Spent at least five hours or more writing a paper (not counting time spent in reading or at the library).
- ○○○○ Asked other people to read something you wrote to see if it was clear to them.
- ○○○○ Referred to a book or manual about style of writing, grammar, etc.
- ○○○○ Revised a paper or composition two or more times before you were satisfied with it.
- ○○○○ Asked an instructor for advice and help to improve your writing.
- ○○○○ Made an appointment to talk with an instructor who had criticized a paper you had written.
- ○○○○ Submitted for publication an article, story, or other composition you had written.

Very often / Often / Occasionally / Never

Personal Experiences

- ○○○○ Told a friend why you reacted to another person the way you did.
- ○○○○ Discussed with other students why some groups get along smoothly, and other groups don't.
- ○○○○ Sought out a friend to help you with a personal problem.
- ○○○○ Elected a course that dealt with understanding personal and social behavior.
- ○○○○ Identified with a character in a book or movie and wondered what you might have done under similar circumstances.
- ○○○○ Read articles or books about personal adjustment and personality development.
- ○○○○ Taken a test to measure your abilities, interests, or attitudes.
- ○○○○ Asked a friend to tell you what he/she really thought about you.
- ○○○○ Been in a group where each person, including yourself, talked about his/her personal problems.
- ○○○○ Talked with a counselor or other specialist about problems of a personal nature.

Very often / Often / Occasionally / Never

Student Acquaintances

- ○○○○ Made friends with students whose academic major field was very different from yours.
- ○○○○ Made friends with students whose interests were very different from yours.
- ○○○○ Made friends with students whose family background (economic and social) was very different from yours.
- ○○○○ Made friends with students whose age was very different from yours.
- ○○○○ Made friends with students whose race was different from yours.
- ○○○○ Made friends with students from another country.
- ○○○○ Had serious discussions with students whose philosophy of life or personal values were very different from yours.
- ○○○○ Had serious discussions with students whose religious beliefs were very different from yours.
- ○○○○ Had serious discussions with students whose political opinions were very different from yours.
- ○○○○ Had serious discussions with students from a country different from yours.

DIRECTIONS: In your experience at this college during the current school year, about how often have you done each of the following?

Very often	Often	Occasionally	Never	Science/Technology
○	○	○	○	Memorized formulas, definitions, technical terms.
○	○	○	○	Tried to express a set of relationships in mathematical terms.
○	○	○	○	Tested your understanding of some scientific principle by seeing if you could explain it to another student.
○	○	○	○	Read articles (not assigned) about scientific theories or concepts.
○	○	○	○	Practiced to improve your skill in using some laboratory equipment.
○	○	○	○	Showed a classmate how to use a piece of scientific equipment.
○	○	○	○	Attempted to explain an experimental procedure to a classmate.
○	○	○	○	Went to an exhibit or demonstration of some new scientific device.
○	○	○	○	Worked on a paper or project where you used a computer.
○	○	○	○	Used a computer to assist in course learning (language skills, math skills, etc.).
○	○	○	○	Wrote a program to analyze data on a computer.
○	○	○	○	Sought out-of-class instruction in ways to use computers.

DIRECTIONS: If you are now living in a dormitory or fraternity/sorority, about how often have you done each of the following in that residence unit during the current school year? Indicate your response by filling in one of the spaces to the left of each statement. If you do not live in a campus residence, omit these items.

Very often	Often	Occasionally	Never	Dormitory or Fraternity/Sorority
○	○	○	○	Had lively conversations about various topics during dinner in the dining room or cafeteria.
○	○	○	○	Gone out with other students for late night snacks.
○	○	○	○	Offered to help another student (with course work, errands, favors, advice, etc.) who needed some assistance.
○	○	○	○	Participated in bull sessions that lasted late into the night.
○	○	○	○	Asked others for assistance in something you were doing.
○	○	○	○	Borrowed things (clothes, records, posters, books, etc.) from others in the residence unit.
○	○	○	○	Attended social events put on by the residence unit.
○	○	○	○	Studied with other students in the residence unit.
○	○	○	○	Helped plan or organize an event in the residence unit.
○	○	○	○	Worked on some community service or fund raising project with other students in the residence unit.

CONVERSATIONS

DIRECTIONS: In conversations with other students at this college during the current school year, about how often have you talked about each of the following?

Very often	Often	Occasionally	Never	Topics of Conversation
○	○	○	○	Job prospects, money, careers.
○	○	○	○	Movies and popular music.
○	○	○	○	Social events, parties.
○	○	○	○	Boyfriends, girlfriends.
○	○	○	○	Current events in the news.
○	○	○	○	Major social problems such as peace, human rights, equality, justice.
○	○	○	○	Different life styles and customs.
○	○	○	○	The ideas and views of other people such as writers, philosophers, historians.
○	○	○	○	Fine arts – painting, theatrical productions, ballet, symphony, etc.
○	○	○	○	Science – theories, experiments, methods.
○	○	○	○	Computers and other technologies.
○	○	○	○	Social and ethical issues related to science and technology such as energy, pollution, chemicals, genetics, military use.

In these conversations with other students, about how often have you done each of the following?

Very often	Often	Occasionally	Never	Information in Conversations
○	○	○	○	Referred to knowledge you had acquired in your reading.
○	○	○	○	Explored different ways of thinking about the topic.
○	○	○	○	Referred to something a professor said about the topic.
○	○	○	○	Subsequently read something that was related to the topic.
○	○	○	○	Changed your opinion as a result of the knowledge or arguments presented by others.
○	○	○	○	Persuaded others to change their minds as a result of the knowledge or arguments you cited.

READING/WRITING

During the current school year, about how many books have you read? Fill in one space in each column.

Textbooks or assigned books | **Non-assigned books**

- ○○ none
- ○○ fewer than 5
- ○○ between 5 and 10
- ○○ between 10 and 20
- ○○ more than 20

During the current school year, about how many written reports have you made? Fill in one space in each column.

Essay exams in your courses | **Term papers or other written reports**

- ○○ none
- ○○ fewer than 5
- ○○ between 5 and 10
- ○○ between 10 and 20
- ○○ more than 20

OPINIONS ABOUT COLLEGE

How well do you like college?

- ○ I am enthusiastic about it.
- ○ I like it.
- ○ I am more or less neutral about it.
- ○ I don't like it.

If you could start over again, would you go to the same college you are now attending?

- ○ Yes, definitely
- ○ Probably yes
- ○ Probably no
- ○ No, definitely

What is your opinion about the following statement: "If students expect to benefit from what this college or university has to offer, they have to take the initiative."

- ○ Strongly agree
- ○ Agree
- ○ Disagree
- ○ Strongly disagree

THE COLLEGE ENVIRONMENT

Colleges differ from one another in the extent to which they emphasize or stress various aspects of students' development. Thinking of your own experience at this college, to what extent do you feel that each of the following is emphasized? The responses are numbered from 7 to 1, with the highest and lowest points described. Fill in the space of whichever number best indicates your impression on this seven-point rating scale.

Emphasis on the development of academic, scholarly, and intellectual qualities

Strong emphasis ⑦ ⑥ ⑤ ④ ③ ② ① **Weak emphasis**

Emphasis on the development of esthetic, expressive, and creative qualities

Strong emphasis ⑦ ⑥ ⑤ ④ ③ ② ① **Weak emphasis**

Emphasis on being critical, evaluative, and analytical

Strong emphasis ⑦ ⑥ ⑤ ④ ③ ② ① **Weak emphasis**

Emphasis on the development of vocational and occupational competence

Strong emphasis ⑦ ⑥ ⑤ ④ ③ ② ① **Weak emphasis**

Emphasis on the personal relevance and practical values of your courses

Strong emphasis ⑦ ⑥ ⑤ ④ ③ ② ① **Weak emphasis**

e next three ratings refer to relationships among people at the college. Again, thinking of your own experience, how uld you rate these relationships on the seven-point scales?

Relationship with other students, student groups, and activities

Friendly, Supportive, Sense of belonging	⑦	⑥	⑤	④	③	②	① Competitive, Uninvolved, Sense of alienation

Relationships with faculty members

Approachable, Helpful, Understanding, Encouraging	⑦	⑥	⑤	④	③	②	① Remote, Discouraging, Unsympathetic

Relationships with administrative personnel and offices

Helpful, Considerate, Flexible	⑦	⑥	⑤	④	③	②	① Rigid, Impersonal, Bound by regulations

ESTIMATE OF GAINS

RECTIONS: In thinking over your experiences in college up to now, to what extent do you feel you have gained or made ogress in each of the following respects? Indicate your response by filling in one of the spaces to the left of each statement.

Quite a bit / Some / Very little

- ○○○ Vocational training – acquiring knowledge and skills applicable to a specific job or type of work.
- ○○○ Acquiring background and specialization for further education in some professional, scientific, or scholarly field.
- ○○○ Gaining a broad general education about different fields of knowledge.
- ○○○ Gaining a range of information that may be relevant to a career.
- ○○○ Developing an understanding and enjoyment of art, music, and drama.
- ○○○ Broadening your acquaintance and enjoyment of literature.
- ○○○ Writing clearly and effectively.
- ○○○ Acquiring familiarity with the use of computers.
- ○○○ Becoming aware of different philosophies, cultures, and ways of life.
- ○○○ Developing your own values and ethical standards.
- ○○○ Understanding yourself – your abilities, interests, and personality.

Very much / Quite a bit / Some / Very little

- ○○○○ Understanding other people and the ability to get along with different kinds of people.
- ○○○○ Ability to function as a team member.
- ○○○○ Developing good health habits and physical fitness.
- ○○○○ Understanding the nature of science and experimentation.
- ○○○○ Understanding new scientific and technical developments.
- ○○○○ Becoming aware of the consequences (benefits/hazards/dangers/values) of new applications in science and technology.
- ○○○○ Ability to think analytically and logically.
- ○○○○ Quantitative thinking – understanding probabilities, proportions, etc.
- ○○○○ Ability to put ideas together, to see relationships, similarities, and differences between ideas.
- ○○○○ Ability to learn on your own, pursue ideas, and find information you need.

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	0	0	0	0
	1	1	1	1
	2	2	2	2
	3	3	3	3
	4	4	4	4
	5	5	5	5
	6	6	6	6
	7	7	7	7
	8	8	8	8
	9	9	9	9

Since the electronic scanning device can only read pencil marks, please fill in the grid at the left corresponding to the number printed above it. This tells us the name of your college and that you are one of the students from that college.

THANK YOU FOR YOUR PARTICIPATION

ADDITIONAL QUESTIONS

1.	A	B	C	D	E
2.	A	B	C	D	E
3.	A	B	C	D	E
4.	A	B	C	D	E
5.	A	B	C	D	E
6.	A	B	C	D	E
7.	A	B	C	D	E
8.	A	B	C	D	E
9.	A	B	C	D	E
10.	A	B	C	D	E

OTHER ID#, if requested

0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7
8	8	3	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9

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APPENDIX B

On Reading the Quality of Effort Tables

The Quality of Effort scales attempt to represent complex sets of experiences subject to or influenced by many causes. This complexity means that the analysis of the scales has to take into account a variety of factors.

For example, one might be interested in the effects of being female on Science Experiences. A table of mean Quality of Effort—Experiences with Science would show that men report higher levels than women in this area. But men are also more likely to major in the physical sciences and engineering than women; students in these fields tend to report higher levels than students in other fields, regardless of gender. This tendency naturally gives rise to the question as to whether differences between men and women in science experiences are not the product of differences in their major fields rather than differences between the sexes.

One might answer the question by examining the mean Quality of Effort of men and women, both in and out of the physical sciences and engineering. Then if men and women differ in the same way regardless of major, one could conclude that sex makes a difference in this area. But two difficulties mitigate against this approach. Increases in the number of independent variables increase the number of dimensions of the table. An analysis of the effects of sex and major requires a two-dimensional table; adding the effects of ethnicity requires a third dimension; a fourth variable adds a fourth dimension, and so forth. Tables with more than three dimensions are very cumbersome, difficult to read and interpret.

A more important limitation of this approach stems from its lack of parsimony; the value calculated for each cell uses information from only those cases in the cell. If, for example, one wished to estimate the mean score for Black sophomore women less than 23 years old majoring in agriculture, one would calculate it for all those in that category. A five dimensional table for Quality of Effort would have 720 different cells. An even distribution would require a sample size of 3600 cases to produce five in each cell.

The Quality of Effort tables are the product of regressing Quality of Effort on five variables: age, sex, class level, ethnicity, and field of study. Regression analysis allows one to estimate the amount of difference in the dependent variable, the Quality of Effort, that is associated with differences in the independent variables. When there is more than one independent variable, as there is here, regression provides estimates of the effects of each while controlling for the effects of the others.

Regression analysis uses the data in the whole sample to estimate a value for each cell and thus requires many fewer cases to produce reliable estimates. Thus, in the case with two independent variables, regression produces an estimate of the effect of

TABLE B-1
QUALITY OF EFFORT: EXPERIENCES WITH SCIENCE AND TECHNOLOGY
REGRESSION COEFFICIENTS

Intercept	*15.832*	*ETHNICITY*	*(p = 0.918)*
AGE	*(p = 0.641)*	Whites	0.117
Less than 23	0.124	Blacks	-0.265
23-27	0.362	Chicanos	-0.116
More than 27	0.000	Asians	0.212
SEX	*(p = 0.002)*	Others	0.000
Male	0.558	*FIELD OF STUDY*	*(p = 0.000)*
Female	0.000	Agriculture	-0.267
CLASS LEVEL	*(p = 0.559)*	Arts/Humanities	-4.259
Freshmen	-0.315	Physical Sciences	3.971
Sophomores	-0.073	Social Sciences	-2.826
Juniors	0.379	Engineering/Computer Sci	4.599
Seniors	0.000	Others	0.000
N:	684	**RANGE**	8-32
MULTIPLE R:	.657	**UC DAVIS MEAN**	16.40
SQUARED MULTIPLE R:	.432	**NATIONAL NORM**	15.9

sex on science experiences allowing for the effect of differences in majors and for the effect of majors, allowing for the effect of sex.

Table B-1, which also appears as Table 12 in the text, provides an example of a table of regression coefficients. The following is intended to assist readers in understanding the various numbers included.

N: The number of cases used to create the estimate; cases with missing data are excluded.

MULTIPLE R and SQUARED MULTIPLE R: The coefficients of multiple correlation (R) and multiple determination (R^2) suggest the explanatory power of the regression. The SQUARED MULTIPLE R suggests the amount of variation in the dependent variable that is explained by the regression equation. In the case of Table B-1, differences in age, sex, class level, ethnicity, and field of study account for 43.2% of the variation in reported Quality of Effort: Experiences with Science and Technology. Considering the complexity of the experiences we are examining, this is a very high coefficient of multiple determination.

Intercept: The intercept is an estimate of the mean score with the effects of age, sex, class level, ethnicity, and field of study held constant. Although not particularly meaningful in itself, it can be used to calculate an estimate for any category of interest.

Category coefficients: Each variable has two or more categories; for SEX these are "Male" and "Female." One category for each of the independent variables has the value 0.000; this is the comparison category. The values in the other categories are estimates of how much cases in those categories differ from the comparison category. Thus, Table B-1 says that, controlling for the effects of sex, class level, ethnicity, and field of study, the youngest students score .124 higher on Quality of Effort: Experiences with Science and Technology than the oldest group of students and the middle category score .362 higher than their older peers.

p =: The "p-values" provide guidance as to which of the variables differ signicantly among their categories. If it is less than 0.050, one may say that there is better than one chance in twenty that the differences among the different categories represent real differences in the undergraduate population. These are the statistically significant variables. In Table B-1, sex and field of study are statistically significant.

Calculation of Cell Values: One can use this table to calculate an estimate for any category of student by adding the coefficient for the appropriate category of each of the independent variables. As a case in point, the estimate for Black sophomore women less than twenty-three years old majoring in agriculture would be 15.832 + 0.124 + 0.000 + (-.0.073) + (-0.265) + (-0.267) = 15.351.

TABLE B-2
QUALITY OF EFFORT: FACTOR LOADINGS
—varimax rotation—

	Interpersonal Experiences	Science and Computer Experiences	Academic Experiences	Experiences with GroupFacilities
Experience in Writing	0.021	-0.061	0.708*	0.267
Course Learning	0.025	0.220	0.699*	0.166
Library Experiences	0.437	0.111	0.593*	-0.146
Student Union	0.762*	0.056	0.110	0.237
Clubs and Organizations	0.728*	0.136	0.069	0.174
Art, Music, Theater	0.591*	-0.082	-0.003	0.289
Experiences with Faculty	0.510*	-0.009	0.443	0.097
Personal Experiences	0.241	-0.221	0.264	0.706*
Student Acquaintances	0.188	0.050	0.242	0.740*
Topics of Conversation	0.379	0.258	0.166	0.600*
Information in Conversations	0.309	0.234	0.418	0.492*
Athletic and Recreation Facilities	0.102	0.284	-0.232	0.470*
Science/Technology	-0.076	0.833*	0.091	0.094
Computer Experiences	0.142	0.698*	0.094	0.032

VARIANCE EXPLAINED BY ROTATED COMPONENTS

Interpersonal Experiences	Science and Computer Experiences	Academic Experiences	Experiences with Group Facilities
2.280	1.527	1.956	2.178

PERCENT OF TOTAL VARIANCE EXPLAINED

Interpersonal Experiences	Science and Computer Experiences	Academic Experiences	Experiences with Group Facilities
16.289	10.910	13.973	15.560

TABLE B-3
REPORTED GAIN FACTOR LOADINGS

	Personal/ Social Development	Science and Tech	GE and the Arts	Intellecual Skills	Job Preparation
Vocational training	0.10	0.17	0.00	0.11	0.78*
Acquiring background and specialization	0.04	0.22	0.10	0.27	0.65*
Gaining a broad general education	0.19	0.05	0.65*	0.03	0.16
Gaining a career information	0.14	0.17	0.27	0.12	0.71*
Understanding art, music and drama	0.12	-0.00	0.70*	-0.06	0.11
Acquaintance and enjoyment of literature	-0.00	-0.06	0.82*	0.08	0.05
Writing clearly and effectively	0.11	-0.04	0.55*	0.42	0.15
Using computers	0.05	0.03	-0.04	0.42	0.26
Awareness of different philosophies	0.30	0.01	0.62*	0.22	-0.15
Developing values and ethical standards	0.67*	0.02	0.38	0.26	-0.03
Self-understanding	0.66*	-0.00	0.28	0.36	0.03
Understanding others	0.80*	0.06	0.18	0.23	0.04
Ability to function as a team member	0.77*	0.06	-0.06	0.13	0.20
Developing good health habits	0.64*	0.22	0.13	-0.04	0.10
Understanding the nature of science	0.14	0.86*	-0.06	0.08	0.15
Understanding developments in science	0.02	0.90*	-0.06	0.09	0.16
Understanding the consequences of new applications in science and technology	0.10	0.79*	0.10	0.16	0.17
Ability to think analytically and logically	0.13	0.41	0.13	0.72*	0.06
Quantitative thinking	0.11	0.53	-0.07	0.51*	0.13
Ability to synthesize ideas	0.23	0.18	0.20	0.73*	0.06
Ability to learn on your own	0.30	0.02	0.15	0.70*	0.20

TABLE B-4

GAIN IN PERSONAL DEVELOPMENT

REGRESSED ON SEX, ETHNICITY, AGE, ACADEMIC FIELD, CLASS LEVEL, STUDY TIME, TIME EMPLOYED, AND QUALITY OF EFFORT

	Reduced Model 1		Reduced Model 2		Reduced Model 3		Structural Equation	
VARIABLE	b	se	b	se	b	se	b	se
INTERCEPT	0.154	0.076	0.022	0.146	0.135	0.238	-1.685	0.353
SEX								
Male	-0.173	0.089	-0.147	0.093	-0.147	0.093	-0.162	0.090
Female	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETHNICITY								
White	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Black	-0.042	0.131	-0.061	0.133	-0.070	0.133	-0.085	0.125
Hispanic	0.097	0.114	0.098	0.115	0.094	0.115	0.090	0.108
Asian	-0.063	0.130	-0.058	0.134	-0.052	0.134	0.019	0.126
Other	0.067	0.171	0.052	0.171	0.049	0.171	0.012	0.160
AGE								
Less than 23	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23-27	-0.367*	0.120	-0.432*	0.131	-0.426*	0.131	-0.209	0.127
28 or older	-0.556*	0.217	-0.591*	0.219	-0.593*	0.220	-0.304	0.210
FIELD								
Agriculture			0.258	0.184	0.245	0.185	0.151	0.179
Arts & Humanities			-0.176	0.157	-0.191	0.159	-0.214	0.177
Physical Sciences			0.000	0.000	0.000	0.000	0.000	0.000
Social Sciences			0.033	0.120	0.011	0.123	-0.055	0.138
Engineering			-0.178	0.133	-0.171	0.134	-0.087	0.127
Other			-0.148	0.152	-0.163	0.153	-0.177	0.154
CLASS LEVEL			0.066	0.042	0.060	0.042	0.039	0.040
TIME SPENT								
On academics				-0.003	0.004	-0.003	0.004	
On the job					0.002	0.003	-0.001	0.003
QUALITY OF EFFORT								
Science							-0.002	0.010
Interpersonal							0.012*	0.003
Group Facilities							0.017*	0.003
Academic							-0.005	0.004
	R^2 = .037		R^2 = .057		R^2 = .058		R^2 = .188	
	F = 2.891*		F = 2.374*		F = 2.101*		F = 6.180*	
Proportional change in R^2		.038		.001		.138		
F-ratio		1.817*		0.272		20.332*		

TABLE B-5

GAIN IN SCIENCE AND TECHNOLOGY

REGRESSED ON SEX, ETHNICITY, AGE, ACADEMIC FIELD, CLASS LEVEL, STUDY TIME TIME EMPLOYED, AND QUALITY OF EFFORT

	Reduced Model 1		Reduced Model 2		Reduced Model 3		Structural Equation	
VARIABLE	b	se	b	se	b	se	b	se
INTERCEPT	-0.252	0.074	0.202	0.125	-0.329	0.200	-1.817	0.279
SEX								
Male	0.440*	0.086	0.293*	0.079	0.298*	0.079	0.188*	0.071
Female	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETHNICITY								
White	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Black	-0.212	0.127	-0.241*	0.113	-0.218	0.112	-0.139	0.099
Hispanic	-0.012	0.110	-0.066	0.098	-0.055	0.097	0.026	0.085
Asian	0.290*	0.125	-0.043	0.114	-0.070	0.113	-0.011	0.099
Other	0.411*	0.165	0.333*	0.146	0.341*	0.144	0.313*	0.127
AGE								
Less than 23	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23-27	0.139	0.116	0.095	0.112	0.073	0.111	0.020	0.100
28 or older	-0.250	0.210	-0.145	0.187	-0.157	0.186	-0.066	0.166
FIELD								
Agriculture			-0.927*	0.157	-0.876*	0.156	-0.431*	0.141
Arts & Humanities			-1.175*	0.134	-1.126*	0.134	-0.274*	0.139
Physical Sciences			0.000	0.000	0.000	0.000	0.000	0.000
Social Sciences			-1.073*	0.103	-0.991*	0.104	-0.333*	0.109
Engineering			-0.291*	0.114	-0.322*	0.113	-0.387*	0.100
Other			-0.771*	0.130	-0.720*	0.129	-0.223	0.122
CLASS LEVEL			*0.100**	*0.035*	*0.119**	*0.036*	*0.121**	*0.032*
TIME SPENT								
On academics					0.013*	0.004	0.008*	0.003
On the job					-0.003	0.003	-0.004	0.003
QUALITY OF EFFORT								
Science							0.099*	0.008
Interpersonal							0.000	0.002
Group Facilities							-0.001	0.003
Academic							-0.002	0.003
	R^2 = .094		R^2 = .310		R^2 = .328		R^2 = .492	
	F = 7.724*		F = 17.778*		F = 16.664*		F = 25.907*	
Proportional change in R^2		.238		.026		.244		
F-ratio		26.817*		6.857*		41.000*		

TABLE B-6

GAIN IN GENERAL EDUCATION, LITERATURE, AND THE ARTS

REGRESSED ON SEX, ETHNICITY, AGE, ACADEMIC FIELD, CLASS LEVEL, STUDY TIME TIME EMPLOYED, AND QUALITY OF EFFORT

	Reduced Model 1		Reduced Model 2		Reduced Model 3		Structural Equation	
VARIABLE	b	se	b	se	b	se	b	se
INTERCEPT	0.136	0.074	-0.231	0.130	-0.332	0.210	-2.047	0.312
SEX								
Male	-0.227*	0.086	-0.031	0.082	-0.031	0.082	0.086	0.080
Female	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETHNICITY								
White	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Black	-0.164	0.126	-0.005	0.117	0.002	0.118	-0.072	0.111
Hispanic	-0.042	0.110	0.080	0.102	0.084	0.102	0.109	0.095
Asian	-0.321*	0.125	-0.030	0.118	-0.036	0.119	-0.017	0.111
Other	0.236	0.165	0.378*	0.151	0.380*	0.152	0.380*	0.142
AGE								
Less than 23	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23-27	-0.035	0.116	-0.125	0.116	-0.130	0.116	-0.101	0.112
28 or older	-0.223	0.210	-0.239	0.194	-0.238	0.195	-0.215	0.185
FIELD								
Agriculture			0.149	0.163	0.160	0.164	0.045	0.159
Arts & Humanities			1.081*	0.139	1.093*	0.140	0.764*	0.156
Physical Sciences			0.000	0.000	0.000	0.000	0.000	0.000
Social Sciences			0.278*	0.106	0.297*	0.109	0.005	0.122
Engineering			-0.467*	0.118	-0.472*	0.119	-0.400*	0.112
Other			0.512*	0.135	0.524*	0.136	0.309*	0.137
CLASS LEVEL			0.010	0.037	0.016	0.038	0.018	0.035
TIME SPENT								
On academics					0.003	0.004	0.001	0.004
On the job					-0.001	0.003	-0.004	0.003
QUALITY OF EFFORT								
Science							-0.023*	0.009
Interpersonal							0.017*	0.002
Group Facilities							-0.005	0.003
Academic							0.008*	0.003
	R^2 = .037		R^2 = .210		R^2 = .211		R^2 = .320	
	F = 2.891*		F = 10.484*		F = 9.107*		F = 12.597*	
Proportional change in R^2		.180		.001		.138		
F-ratio		18.760*		0.324		20.357*		

TABLE B-7
GAIN IN INTELLECTUAL DEVELOPMENT
REGRESSED ON SEX, ETHNICITY, AGE, ACADEMIC FIELD, CLASS LEVEL, STUDY TIME TIME EMPLOYED, AND QUALITY OF EFFORT

	Reduced Model 1		Reduced Model 2		Reduced Model 3		Structural Equation	
VARIABLE	b	se	b	se	b	se	b	se
INTERCEPT	-0.023	0.076	-0.407	0.143	-0.877	0.231	-2.406	0.355
SEX								
Male	-0.019	0.088	-0.078	0.091	-0.067	0.090	-0.002	0.091
Female	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETHNICITY								
White	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Black	0.181	0.130	0.114	0.130	0.112	0.129	0.085	0.126
Hispanic	-0.013	0.113	-0.037	0.112	-0.039	0.112	-0.018	0.108
Asian	0.059	0.128	0.060	0.131	0.039	0.130	0.064	0.126
Other	-0.161	0.169	-0.175	0.167	-0.174	0.166	-0.120	0.161
AGE								
Less than 23	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23-27	0.290*	0.119	0.165	0.128	0.149	0.127	0.081	0.128
28 or older	0.067	0.215	-0.089	0.214	-0.126	0.214	-0.182	0.211
FIELD								
Agriculture			0.219	0.180	0.252	0.180	0.319	0.180
Arts & Humanities			0.007	0.154	0.022	0.154	0.061	0.177
Physical Sciences			0.000	0.000	0.000	0.000	0.000	0.000
Social Sciences			0.339*	0.117	0.384*	0.120	0.418*	0.139
Engineering			0.477*	0.130	0.449*	0.130	0.549*	0.128
Other			0.034	0.148	0.059	0.149	0.114	0.155
CLASS LEVEL			0.101*	0.041	0.104*	0.041	0.083*	0.040
TIME SPENT								
On academics				0.011*	0.004	0.004	0.004	
On the job					0.004	0.003	0.002	0.003
QUALITY OF EFFORT								
Science							0.010	0.010
Interpersonal							-0.000	0.003
Group Facilities							-0.001	0.004
Academic							0.018*	0.004
	R^2 = .018		R^2 = .067		R^2 = .080		R^2 = .148	
	F = 1.326		F = 2.820*		F = 2.958*		F = 4.627*	
Proportional change in R^2		.050		.014		.074		
F-ratio		4.499*		3.617*		10.136*		

TABLE B-8

GAIN IN VOCATIONAL SKILLS

REGRESSED ON SEX, ETHNICITY, AGE, ACADEMIC FIELD, CLASS LEVEL, STUDY TIME TIME EMPLOYED, AND QUALITY OF EFFORT

	Reduced Model 1		Reduced Model 2		Reduced Model 3		Structural Equation	
VARIABLE	b	se	b	se	b	se	b	se
INTERCEPT	-0.004	0.075	-0.290	0.142	-0.619	0.229	-1.502	0.363
SEX								
Male	0.136	0.087	0.040	0.090	0.050	0.090	0.072	0.092
Female	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETHNICITY								
White	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Black	-0.174	0.129	-0.197	0.128	-0.207	0.128	-0.220	0.128
Hispanic	0.076	0.112	0.074	0.111	0.068	0.111	0.079	0.111
Asian	0.085	0.128	0.006	0.129	-0.008	0.129	0.013	0.129
Other	-0.177	0.168	-0.182	0.166	-0.184	0.165	-0.176	0.165
AGE								
Less than 23	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23-27	0.110	0.118	-0.058	0.127	-0.067	0.126	-0.052	0.130
28 or older	0.008	0.214	-0.083	0.212	-0.120	0.212	-0.086	0.215
FIELD								
Agriculture			0.077	0.178	0.094	0.178	0.104	0.184
Arts & Humanities			-0.246	0.152	-0.246	0.153	-0.238	0.181
Physical Sciences			0.000	0.000	0.000	0.000	0.000	0.000
Social Sciences			-0.193	0.116	-0.172	0.119	-0.176	0.142
Engineering			0.289*	0.129	0.269*	0.129	0.312*	0.131
Other			-0.006	0.147	0.003	0.148	0.014	0.159
CLASS LEVEL			0.148*	0.040	0.145*	0.041	0.137*	0.041
TIME SPENT								
On academics					0.007	0.004	0.005	0.004
On the job					0.005	0.003	0.004	0.003
QUALITY OF EFFORT								
Science							0.004	0.011
Interpersonal							0.003	0.003
Group Facilities							0.002	0.004
Academic							0.005	0.004
	R^2 = .017		R^2 = .072		R^2 = .081		R^2 = .099	
	F = 1.320		F = 3.075*		F = 3.020*		F = 2.935*	
Proportional change in R^2		.056		.010		.020		
F-ratio		5.077*		2.507*		2.488*		

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